United States
Department of
Agriculture

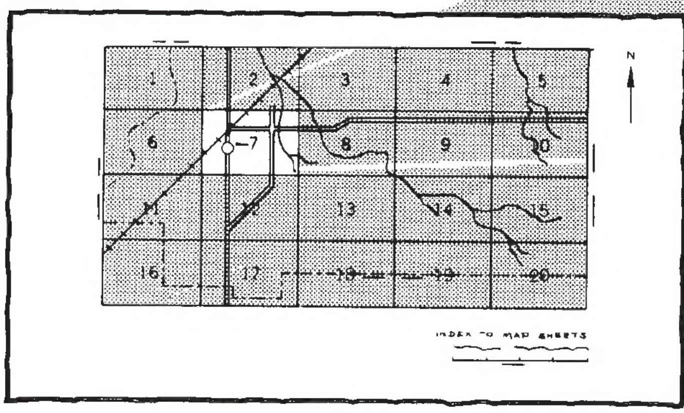
Soil
Conservation
Service

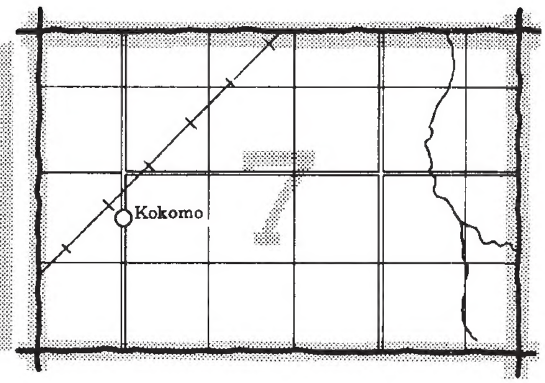
In cooperatin with
Virginia Polytechnic Institute
and State University

Soil Survey of Prince George County, Virginia

HOW TO USE

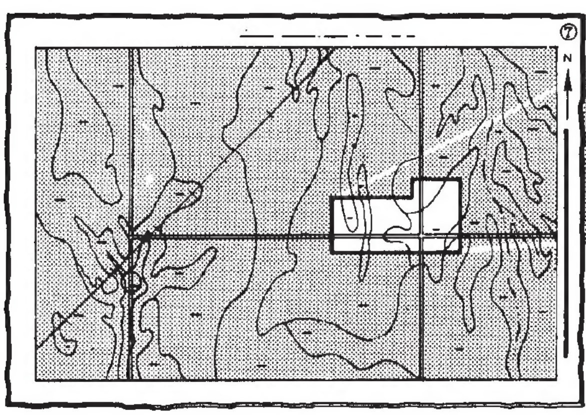
1. Locate your area of interest on the "Index to Map Sheets" (the last page of this publication).

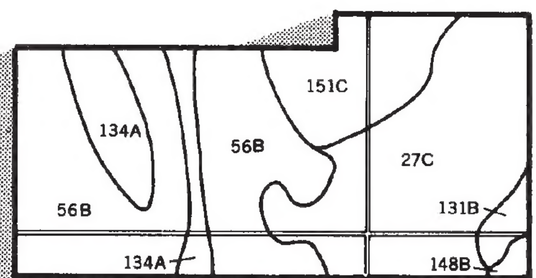




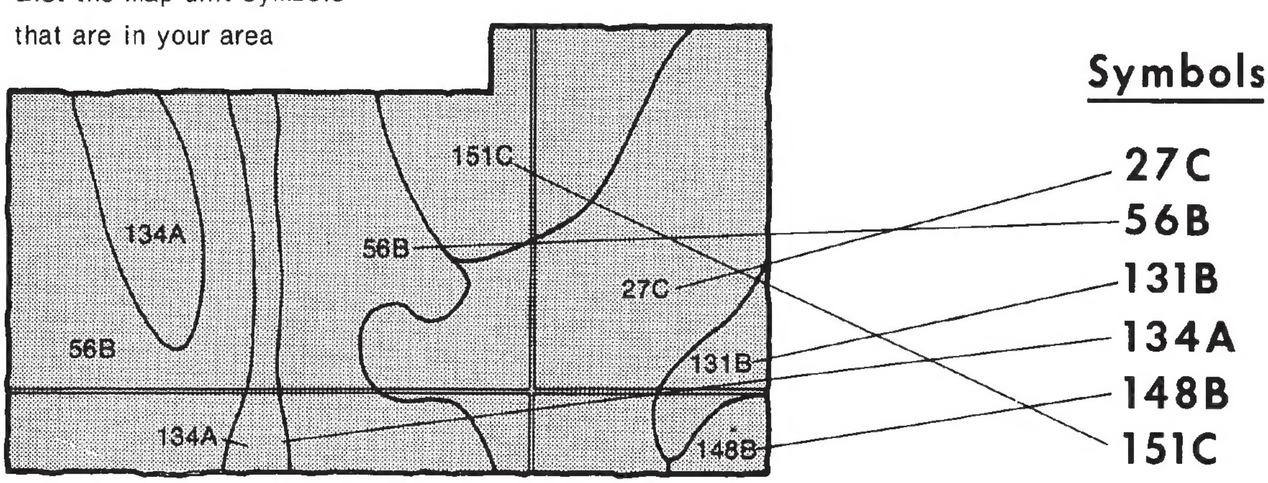
2. Note the number of the map sheet and turn to that sheet.

3. Locate your area of interest on the map sheet.



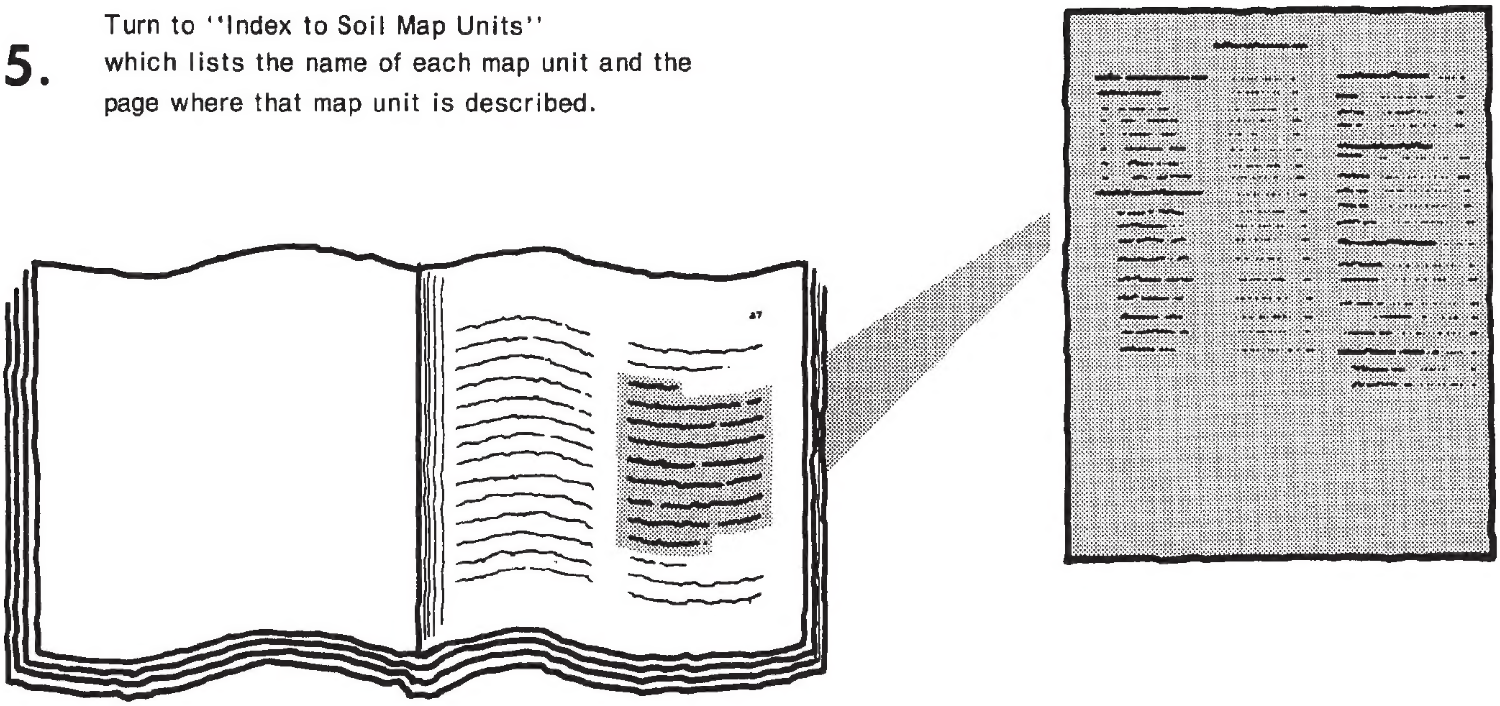


4. List the map unit symbols that are in your area

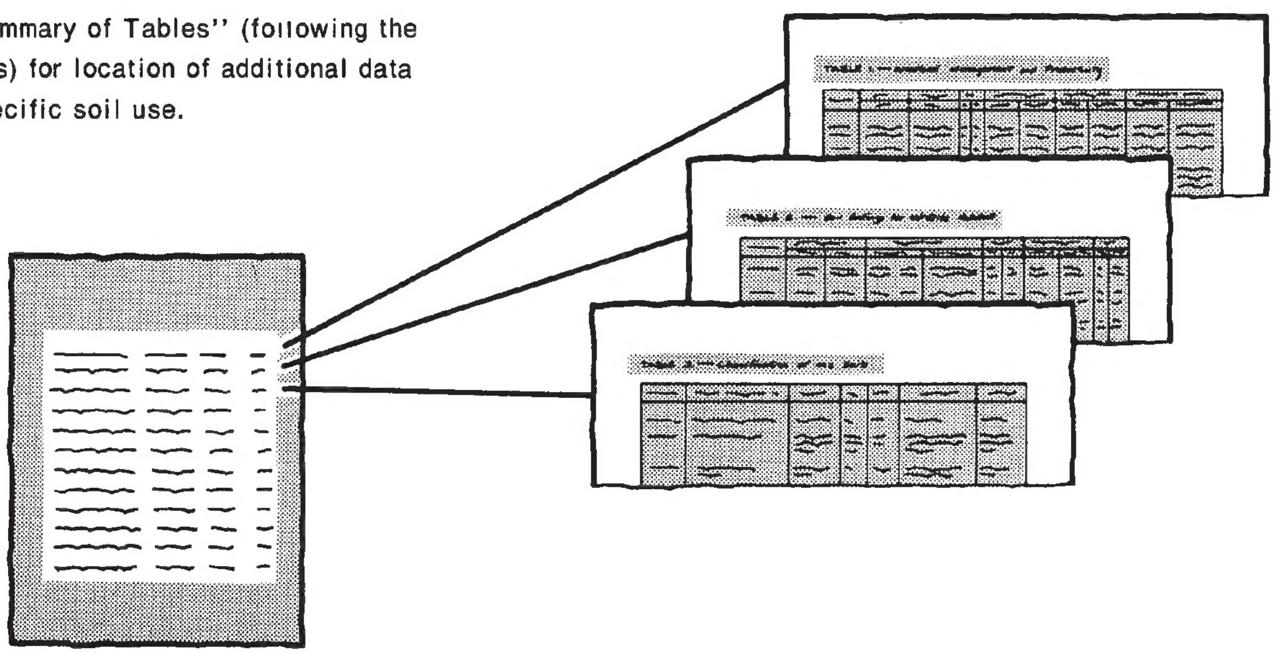


THIS SOIL SURVEY

5. Turn to "Index to Soil Map Units" which lists the name of each map unit and the page where that map unit is described.



6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; for specialists in wildlife management, waste disposal, or pollution control.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was completed in 1980. Soil names and descriptions were approved in 1980. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1980. This survey was made cooperatively by the Soil Conservation Service and the Virginia Polytechnic Institute and State University. Additional assistance was provided by the Prince George County Board of Supervisors, the City of Hopewell, the Virginia Soil and Water Conservation Commission, and the Fort Lee Military Reservation. The survey is part of the technical assistance furnished to the James River Soil and Water Conservation District.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

contents

soil series

Issued May 1985

index to map units

summary of tables

foreword

This soil survey contains information that can be used in land-planning programs in the survey area. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

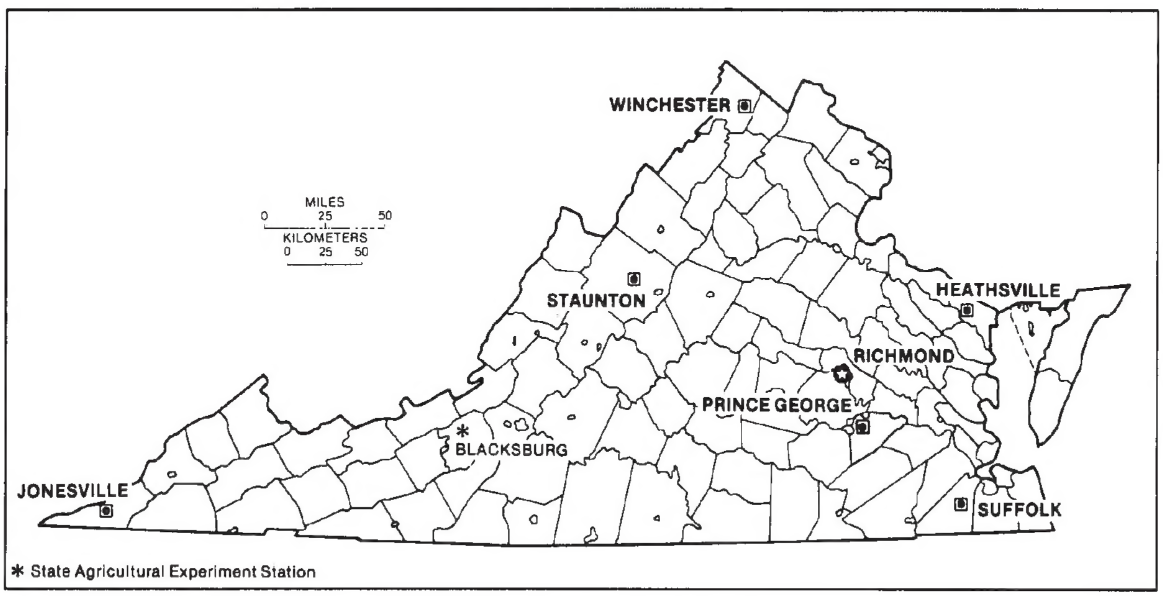
This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the Cooperative Extension Service.

Marty S. Wilder

Paul A. Dodd
State Conservationist
Soil Conservation Service



Location of Prince George County in Virginia

soil survey of
Prince George County, Virginia

By David L. Jones, Ian A. Rodihan, Louis E. Cullipher, John W. Clay,
and Michael J. Marks, Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service
in cooperation with
the Virginia Polytechnic Institute and State University

PRINCE GEORGE COUNTY is in the southeastern Virginia Tidewater area. It has an area of about 188,992 acres, or 295.3 square miles. The county seat, Prince George, is in the northwestern section of the county. According to the U.S. Bureau of Census, the population of Prince George County in 1980 was 25,733.

Farming and wood production are the main land uses in the survey area. Most farms produce corn, peanuts, soybeans and wheat. A few produce cattle, hogs, and tobacco. Woodland covers about 60 percent of the survey area, and wood-related industries are a major part of the economy of the area.

The main automotive routes in the county are I-95, U.S. routes 301 and 460, and Virginia routes 156, 10, 35, and 36. The county is served by two rail systems, and port facilities are available at Hopewell on the James River.

general nature of the survey area

This section gives general information about some of the physical and cultural factors that affect the soils in Prince George County.

climate

Prepared by the National Climatic Center, Asheville, North Carolina.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Hopewell, Virginia, in the period 1951 to 1978. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 41 degrees F, and the average daily minimum temperature is 31 degrees. The lowest temperature on record, which occurred at Hopewell on January 16, 1972, is -3 degrees. In summer the average temperature is 78 degrees, and the average daily maximum temperature is 88 degrees. The highest recorded temperature, which occurred on June 26, 1952, is 104 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 44.5 inches. Of this, 24 inches, or 50 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 20 inches. The heaviest 1-day rainfall during the period of record was 5.54 inches at Hopewell on September 23, 1978. Thunderstorms occur on about 40 days each year, and most occur in summer.

The average seasonal snowfall is 9 inches. The greatest snow depth at any one time during the period of record was 25 inches. On an average of one day, at least 1 inch of snow is on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 50 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 70 percent of the time possible in summer and 50 percent in winter. The prevailing wind is from the southwest. Average windspeed is highest, 9 miles per hour, in spring.

agriculture and industry

The main crops in Prince George County are corn, peanuts, and soybeans; a small acreage is in tobacco and wheat, and there are a few permanent pastures. The livestock enterprises consist mainly of hogs and beef cattle.

Sand and gravel quarries, sawmills, and metal works are the major nonfarm industries of Prince George County. Most of the sand and gravel quarries are in the northwestern part of the county along the Appomattox River.

Most of the other nonfarm industries in the survey area are in Hopewell, and some of those are related to agriculture or woodland products. The Appomattox and James Rivers provide a base for the county's fishing industry.

physiography, relief, and drainage

Prince George County lies entirely within the Coastal Plain physiographic province. Most of the survey area is on the Sunderland terrace plain, but sections of it are on the Wicomico, Chowan, and Dismal Swamp terraces. The Sunderland terrace is about 90 to 175 feet above sea level, the Wicomico terrace about 70 to 90 feet above sea level, the Chowan terrace about 25 to 70 feet above sea level, and the Dismal Swamp terrace about 5 to 25 feet above sea level.

Most of the survey area is nearly level to sloping; some areas along drainageways are moderately steep to steep. The soils are mostly well drained or moderately well drained but range from somewhat excessively drained to very poorly drained.

The survey area is drained by the James, Appomattox, Nottoway, and Blackwater Rivers and their tributaries. The drainage pattern is dendritic and irregularly branched, and on upland flats it is weakly expressed. Many streams have a very low gradient, and stream channels readily overflow during wet periods.

natural resources

Prince George County has a variety of natural resources, including the soils and the farms and woodland they support.

The Appomattox and James Rivers and their tributaries not only provide recreation opportunities, but also provide a habitat for saltwater fish such as shad and herring, and the banks of the two rivers are sources of sand and gravel. The estuaries and swamps of the county provide sanctuary for wintering populations of waterfowl such as Canada geese and many kinds of ducks.

The pattern of adjoining fields and woodland throughout the county serve as habitat for upland game, including white-tailed deer, quail, dove, turkey, fox, rabbit, squirrel, and raccoon.

how this survey was made

Soil scientists made this survey to learn what soils are in the survey area, where they are, and how they can be used. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; and the kinds of native plants or crops. They dug many holes to study soil profiles. A profile is the sequence of natural layers, or horizons, in a soil. It extends from the surface down into the parent material, which has been changed very little by leaching or by plant roots.

The soil scientists recorded the characteristics of the profiles they studied and compared those profiles with others in nearby counties and in more distant places. They classified and named the soils according to nationwide uniform procedures. They drew the boundaries of the soils on aerial photographs. These photographs show trees, buildings, fields, roads, and other details that help in drawing boundaries accurately. The soil maps at the back of this publication were prepared from aerial photographs.

The areas shown on a soil map are called map units. Most map units are made up of one kind of soil. Some are made up of two or more kinds. The map units in this survey area are described under "General soil map units" and "Detailed soil map units."

While a soil survey is in progress, samples of some soils are taken for laboratory measurements and for engineering tests. All soils are field tested to determine their characteristics. Interpretations of those characteristics may be modified during the survey. Data are assembled from other sources, such as test results, records, field experience, and state and local specialists. For example, data on crop yields under defined management are assembled from farm records and from field or plot experiments on the same kinds of soil.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so that it can be used by farmers, woodland managers, engineers, planners, developers and builders, home buyers, and others.

general soil map units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, a map unit consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in other units but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

soil descriptions

1. Ackwater-Montross-Aycock

Deep, moderately well drained and well drained soils that have a clayey or loamy subsoil; formed in fluvial and marine sediments on uplands

This unit makes up about 23 percent of the land area of the county. The unit consists of broad areas of two main types: (1) nearly level and gently sloping soils between large drainageways and (2) narrow areas of sloping and moderately steep soils along large drainageways and streams (fig. 1).

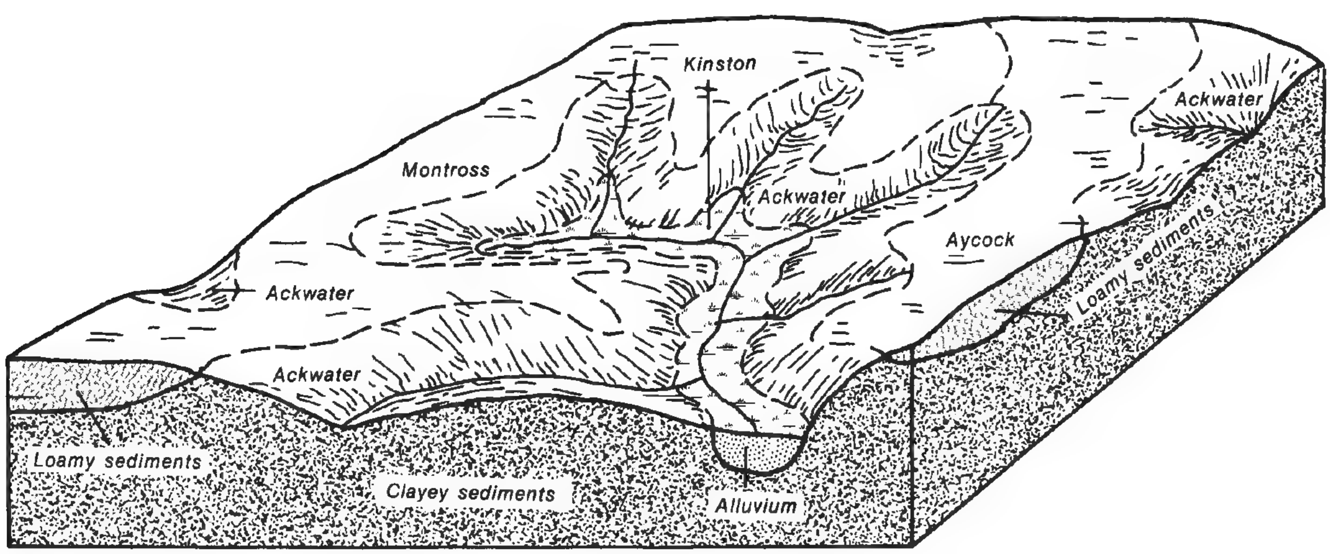


Figure 1.—Typical pattern of soils and underlying material in the Ackwater-Montross-Aycock unit.

The Ackwater soils make up about 43 percent of the unit, the Montross soils about 19 percent, the Aycock soils about 18 percent, and soils of minor extent about 20 percent.

The Ackwater soils are moderately well drained and have slow permeability. They have a subsoil of mostly silty clay loam and silty clay and have a seasonal high water table perched at a depth of about 1-1/2 to 3 feet.

The Montross soils are moderately well drained and have moderately slow permeability. They have a subsoil of mostly silt loam, silty clay loam, and silty clay; much of the upper part of the subsoil is compact and brittle. A seasonal high water table is perched at a depth of about 1-1/2 to 2-1/2 feet.

The Aycock soils are well drained and have moderate permeability. They have a subsoil of mostly silt loam and silty clay loam and have a seasonal high water table perched at a depth of about 4 to 6 feet.

The common minor soils of this unit are well drained Bonneau, Emporia, and Norfolk soils; very poorly drained Kinston soils; somewhat poorly drained Lynchburg soils; poorly drained Rains soils; moderately well drained Slagle soils; and Udorthents. The Bonneau, Emporia, and Norfolk soils are on points of ridges and knobs throughout the unit. The Kinston soils are in bottoms along drainageways and streams. The Slagle, Lynchburg, and Rains soils are in depressions and on benches that slope toward drainageways. Udorthents are in small areas throughout the unit, mainly near urban areas or public roads where the soils have been disturbed.

This unit is used mainly for woodland, but some areas are in farms and some are used for residential development. Much of the unit is managed for wood production. A seasonal high water table and slow or moderately slow permeability limit much of this unit for community development. Most of the unit has good suitability for farming.

2. Slagle-Emporia-Bonneau

Deep, moderately well drained and well drained soils that have a loamy subsoil; formed in fluvial and marine sediments on uplands

This unit makes up about 35 percent of the land area of the county. The unit consists of two main areas: (1) broad areas of nearly level and gently sloping soils between large drainageways and (2) narrow areas of sloping to very steep soils along streams and drainageways (fig. 2).

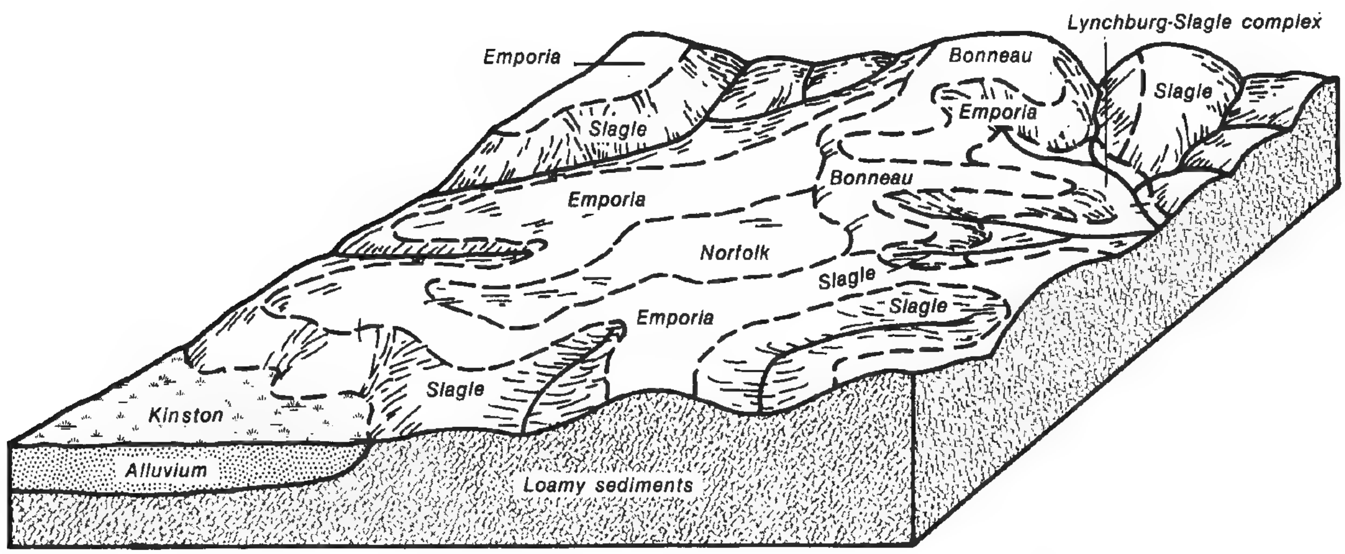


Figure 2.—Typical pattern of soils and underlying material in the Slagle-Emporia-Bonneau unit.

The Slagle soils make up about 31 percent of the unit, the Emporia soils about 30 percent, the Bonneau soils about 8 percent, and soils of minor extent about 31 percent.

The Slagle soils are moderately well drained and have moderate permeability in the upper part of the subsoil and moderately slow permeability in the lower part. They have a subsoil of mostly sandy loam and sandy clay loam and have a seasonal high water table perched at a depth of 1-1/2 to 3 feet.

The Emporia soils are well drained and have moderate permeability in the upper part of the subsoil and moderately slow permeability in the lower part. They have a subsoil of mostly loam, clay loam, and sandy clay loam and have a seasonal high water table perched at a depth of 3 to 4-1/2 feet.

The Bonneau soils are well drained and have moderate permeability. They have a subsoil of mostly fine sandy loam and sandy clay loam and have a seasonal high water table at a depth of 3-1/2 to 5 feet.

The common minor soils in this unit are well drained Norfolk and Aycock soils; moderately well drained Ackwater, Montross, and Burrowsville soils; somewhat poorly drained Lynchburg soils; poorly drained Kinston and Rains soils; and Udorthents and Urban land. The Kinston, Rains, and Lynchburg soils are in and adjacent to small drainageways throughout the unit. Udorthents and Urban land are mostly in residential and urban areas. The Ackwater, Montross soils, and Aycock soils are mainly on broad areas throughout the unit. The Norfolk soils are on points of broad areas, and the Burrowsville soils are on benches and foot slopes.

This unit is used mainly for cultivated crops, woodland, and community development. The soils with a seasonal high water table respond well to artificial drainage, but the Emporia soils have some restrictions as a site for septic tanks because of the moderately slow permeability in the subsoil.

3. Pamunkey-Argent-Bolling

Deep, well drained, poorly drained, and moderately well drained soils that have a loamy or clayey subsoil; formed in fluvial sediments on river and stream terraces

This unit makes up about 5 percent of the land area of the county. The unit consists of broad areas of nearly level and gently sloping soils and of nearly level soils along shallow drainageways (fig. 3).

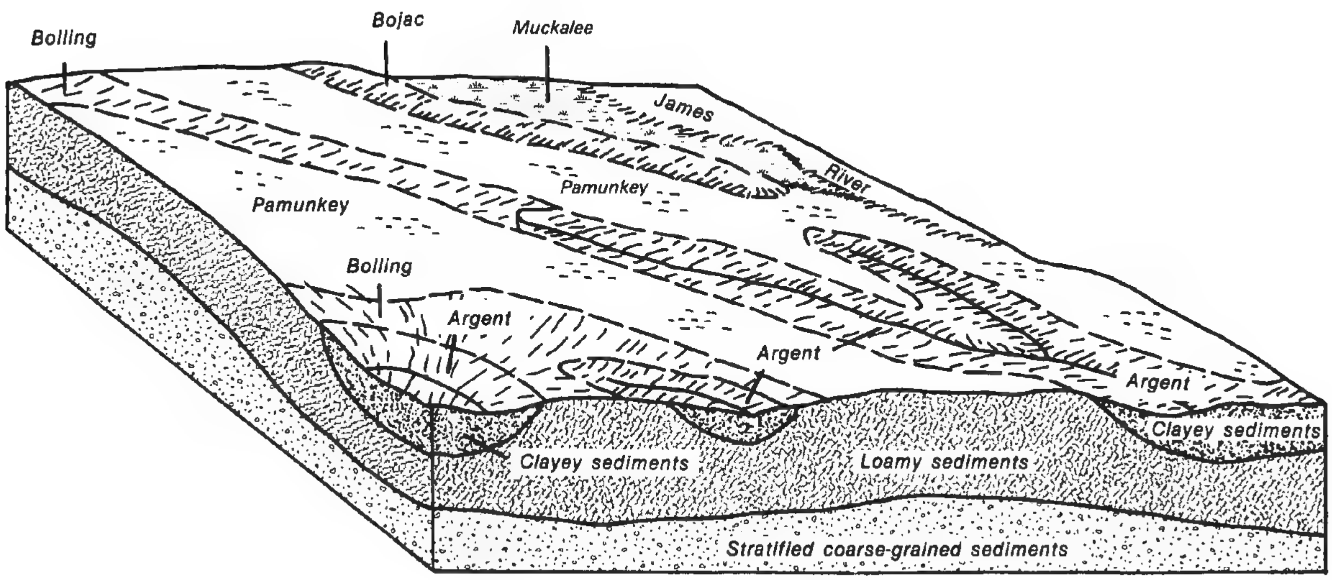


Figure 3.—Typical pattern of soils and underlying material in the Pamunkey-Argent-Bolling unit.

The Pamunkey soils make up about 38 percent of this unit, the Argent soils about 23 percent, the Bolling soils about 11 percent, and soils of minor extent about 28 percent.

The Pamunkey soils are well drained and have moderate permeability. They have a subsoil of mostly clay loam and sandy clay loam.

The Argent soils are poorly drained and have slow permeability. They have a subsoil of mostly clay loam and silty clay and have a seasonal high water table at a depth of 1 foot.

The Bolling soils are moderately well drained and have moderate permeability. They have a subsoil of mostly silt loam, silty clay loam, and clay loam and have a seasonal high water table at a depth of 1-1/2 to 2-1/2 feet.

The minor soils of this unit are well drained Bojac and Wickham soils, poorly drained Chickahominy soils, very poorly drained Levy soils, and poorly drained Muckalee soils. The Bojac soils are mostly at lower elevations adjacent to drainageways. The Chickahominy soils are in shallow drainageways adjacent to higher areas that are mostly along the Appomattox River. The Wickham soils are at higher areas mostly along the Appomattox River.

The Muckalee soils are on wooded flood plains, and the Levy soils are in grassy marshes adjacent to open water.

This unit is used mainly for cultivated crops. Some community development has taken place, and some areas are used as a source of sand and gravel.

4. Peawick-Emporia-Wickham

Deep, moderately well drained and well drained soils that have a clayey or loamy subsoil; formed in fluvial sediments on uplands

This unit makes up about 19 percent of the land area of the county. The unit consists of nearly level to gently sloping soils in broad areas and of sloping to very steep soils in narrow areas along drainageways (fig. 4).

The Peawick soils make up about 30 percent of the unit, the Emporia soils about 27 percent, the Wickham soils about 11 percent, and soils of minor extent about 32 percent.

The Peawick soils are moderately well drained and have very slow permeability. They have a subsoil of mostly silty clay loam, silty clay, and clay and have a seasonal high water table perched at a depth of 1-1/2 to 3 feet.

The Emporia soils are well drained and have moderate permeability in the upper part of the subsoil and moderately slow permeability in the lower part. They have a subsoil that is mostly loam, clay loam, and sandy clay loam and a seasonal high water table perched at a depth of 3 to 4-1/2 feet.

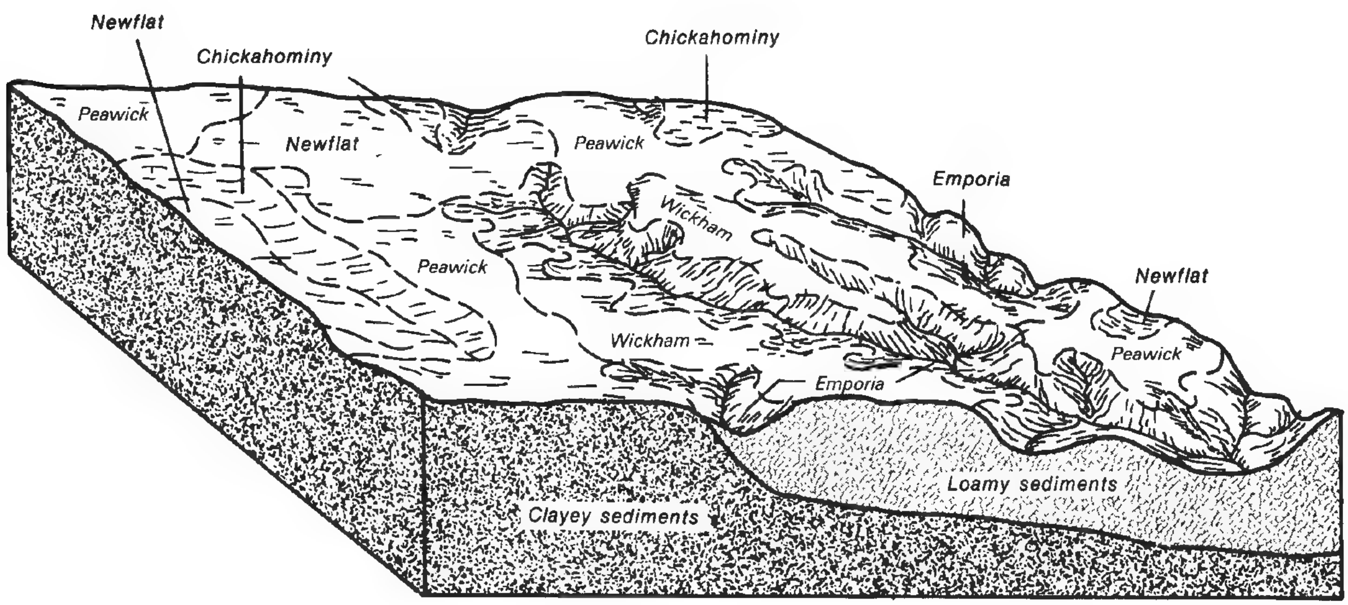


Figure 4.—Typical pattern of soils and underlying material in the Peawick-Emporia-Wickham unit.

The Wickham soils are well drained and have moderate permeability. They have a subsoil of mostly loam, sandy clay loam, clay loam, and sandy loam.

The common minor soils of this unit are moderately well drained Burrowsville and Slagle soils; well drained Emporia soils; poorly drained Muckalee, Kinston, and Chickahominy soils; very poorly drained Levy soils; somewhat excessively drained Catpoint soils; somewhat poorly drained Newflat soils; and Udorthents and Urban land. The Burrowsville, Emporia, and Slagle soils are throughout the unit. The Levy, Muckalee, and Kinston soils are in drainageways and along rivers and major creeks. The Catpoint soils are along drainageways on benches. The Chickahominy and Newflat soils are in broad areas and in depressions throughout the unit. Udorthents and Urban land are throughout the unit.

This unit is used mainly for woodland. A small acreage is used for farming. The main limitations for community development are the very slow permeability and seasonal high water table in the Peawick soils and the slope of the Emporia soils.

5. Montross-Rains-Lynchburg

Deep, moderately well drained, poorly drained, and somewhat poorly drained soils that have a loamy subsoil; formed in fluvial and marine sediments on uplands

This unit makes up about 8 percent of the land area of the county. The unit consists of broad areas of nearly level and gently sloping soils.

The Montross soils make up about 35 percent of this unit, the Rains soils about 18 percent, the Lynchburg soils about 16 percent, and soils of minor extent about 31 percent.

The Montross soils are moderately well drained and have moderately slow permeability. They have a subsoil of mostly silt loam, silty clay loam, and silty clay. The subsoil is compact and brittle in the upper part. The Montross soils have a seasonal high water table perched at a depth of about 1-1/2 to 2-1/2 feet.

The Rains soils are poorly drained and have moderate permeability. They have a subsoil of mostly loam and have a seasonal high water table at a depth of 1 foot.

The Lynchburg soils are somewhat poorly drained and have moderate permeability. They have a subsoil of mostly loam and clay loam and have a seasonal high water table at a depth of about 1/2 foot to 1-1/2 feet.

The common minor soils in this unit are moderately well drained Ackwater, Burrowsville, and Slagle soils and well drained Aycock, Bonneau, Emporia, and Norfolk soils. They are mostly near the boundaries of the unit. Poorly drained Kinston soils are in drainageways, and Udorthents are throughout the unit.

This unit is used for cultivated crops, woodland, and community development. Most of the unit has soils with a seasonal high water table which restricts community development. The soils respond well to artificial drainage if suitable outlets can be established.

6. Kinston

Deep, poorly drained soils that have a loamy substratum; formed in fluvial sediments on flood plains

This map unit makes up about 9 percent of the land area of the county. The unit consists of nearly level soils in large drainageways throughout the survey area. Seasonal wetness and flooding are the main characteristics of the unit.

The Kinston soils make up about 85 percent of this unit and minor soils about 15 percent.

The Kinston soils have moderate permeability. They have a substratum of mostly clay loam and have a water table within 1 foot of the surface.

The common minor soils in this unit are moderately well drained Ackwater, Montross, and Slagle soils at the heads of drainageways and along the edges of the unit. Somewhat poorly drained Lynchburg soils and poorly drained Rains soils are at slightly higher, islandlike positions in the unit.

This unit consists of swampy areas used mainly as woodland and for wetland wildlife habitat.

7. Muckalee-Levy

Deep, poorly drained and very poorly drained soils that have a loamy or clayey substratum; formed in fluvial sediments on flood plains and tidal flats

This unit makes up about 1 percent of the land area of the county. The unit consists of nearly level, low-lying areas along shallow drainageways near the James River and of areas along the James River that are subject to daily tidal overflow.

The Muckalee soils make up about 49 percent of the unit, the Levy soils about 47 percent, and soils of minor extent about 4 percent.

The Muckalee soils are poorly drained and have moderate permeability. They have a substratum that is mostly sandy loam and have a seasonal high water table at a depth of 1/2 foot to 1-1/2 feet.

The Levy soils are very poorly drained and have slow permeability. They have a substratum of mostly silty clay. Levy soils are flooded daily from tidal overflow.

The common minor soils in this unit are well drained Bojac and Pamunkey soils, somewhat excessively drained Catpoint soils, and poorly drained Argent soils. These soils are mostly in higher depressional areas.

This unit is used mainly for woodland and as a habitat area for waterfowl.

detailed soil map units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under "Use and management of the soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, *Emporia fine sandy loam, 2 to 6 percent slopes*, is one of several phases in the Emporia series.

Some map units are made up of two or more major soils. These map units are called soil complexes or undifferentiated groups.

A *soil complex* consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. *Lynchburg-Slagle complex* is an example.

An *undifferentiated group* is made up of two or more soils that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils in a mapped area are not uniform. An area can be made up of only one of the major soils, or it can be made up of all of them. *Emporia and Slagle soils, 6 to 15 percent slopes*, is an undifferentiated group in this survey area.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. *Urban land* is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

soil descriptions

1A—Ackwater silt loam, 0 to 2 percent slopes. This soil is deep, nearly level, and moderately well drained. It is on broad upland flats. The areas of this soil are long and narrow or irregularly oval. They range from about 5 to 40 acres.

Typically, the surface layer of this soil is light yellowish brown silt loam about 5 inches thick. The subsoil extends to a depth of at least 72 inches. It is yellowish brown silty clay loam in the upper 11 inches and strong brown silty clay in the next 12 inches. It is mottled brown, gray, red, and yellow silty clay below a depth of 28 inches.

Included with this soil in mapping are small areas of well drained Aycock soils and moderately well drained Montross soils. The Aycock soils are on the higher areas of the unit, and the Montross soils are on broad upland flats. Included soils make up about 10 percent of this unit.

The permeability of this Ackwater soil is slow, and the available water capacity is moderate. Surface runoff is slow. The erosion hazard is slight. The subsoil has a high shrink-swell potential. The root zone commonly

extends to a depth of 60 inches or more. The soil is low in organic matter content and natural fertility. It mainly ranges from extremely acid through strongly acid, but reaction of the surface layer varies because of local liming practices. A seasonal high water table is perched at a depth of 1-1/2 to 3 feet during winter and early spring.

Most areas of this soil are in woodland. A few areas are farmed.

This soil is well suited to cultivated crops and to pasture and hay. The erosion hazard is slight and is not a major management concern. After heavy rains, however, a crust forms on the surface, and the surface layer becomes compacted. The need to increase organic matter content, the need for lime and fertilizer to offset the acidity and low natural fertility, and the need for adequate drainage are major management concerns. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops and grasses and legumes in the cropping system; and keeping crop residue on or in the soil. All those practices help to reduce runoff and control erosion, maintain organic matter content and tilth, reduce crusting, and increase water infiltration in the soil.

Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is too wet compact the surface layer and damage the stands of grasses and legumes.

The potential productivity for trees on this soil is moderately high, especially for loblolly pine, southern red oak, white oak, and sweetgum. Seeds and seedlings survive and grow well if competing vegetation is controlled. The soil is soft when wet, thus limiting the use of heavy timber equipment.

The seasonal high water table and the high shrink-swell potential and slow permeability of the subsoil are the main limitations of the soil for community development. They limit the use of the soil as a building site, as a site for sanitary landfills or septic tank absorption fields, and for some types of recreation. The soil has low strength as a subgrade material for local roads and streets.

The capability subclass is IIw.

1B—Ackwater silt loam, 2 to 6 percent slopes. This soil is deep, gently sloping, and moderately well drained. It is on upland ridges and side slopes. Slopes are 150 to 600 feet long. The areas of this soil are long and narrow or irregularly oval. They range from about 5 to 50 acres.

Typically, the surface layer of this soil is light yellowish brown silt loam about 5 inches thick. The subsoil extends to a depth of at least 72 inches. It is yellowish brown silty clay loam in the upper 11 inches and strong brown silty clay in the next 12 inches. It is mottled brown, gray, red, and yellow silty clay below a depth of 28 inches.

Included with this soil in mapping are small areas of well drained Aycock soils and moderately well drained Montross soils. The Aycock soils are on the higher areas of the unit, and the Montross soils are on ridges and side slopes. Included soils make up about 10 percent of this unit.

The permeability of this Ackwater soil is slow, and the available water capacity is moderate. Surface runoff is medium. The erosion hazard is moderate. The subsoil has a high shrink-swell potential. The root zone commonly extends to a depth of 60 inches or more. The soil is low in organic matter content and natural fertility. It mainly ranges from extremely acid through strongly acid, but reaction of the surface layer varies because of local liming practices. A seasonal high water table is perched at a depth of 1-1/2 to 3 feet during winter and early spring.

Most areas of this soil are in woodland. A few areas are farmed.

This soil is well suited to cultivated crops and to pasture and hay. The erosion hazard is moderate. After heavy rains, a crust forms on the surface, and the surface layer becomes compacted. The need to increase organic matter content, the need for lime and fertilizer to offset the acidity and low natural fertility, and the need for erosion control are the main management concerns. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops and grasses and legumes in the cropping system; keeping crop residue in or on the soil; and using contour tillage. All help to reduce runoff and control erosion, maintain organic matter content and tilth, reduce crusting, and increase water infiltration in the soil.

Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is too wet compact the surface layer and damage the stands of grasses and legumes, which results in increased runoff and erosion.

The potential productivity for trees on this soil is moderately high, especially for loblolly pine, southern red oak, white oak, and sweetgum. Seeds and seedlings survive and grow well if competing vegetation is controlled. The soil is soft when wet, thus limiting the use of heavy timber equipment.

The seasonal high water table and the high shrink-swell potential and slow permeability of the subsoil are the main limitations of the soil for community development. They limit the use of the soil as a building site, as a site for sanitary landfills or septic tank absorption fields, and for some types of recreation. The

soil has low strength as a subgrade material for local roads and streets.

The capability subclass is IIe.

1C—Ackwater silt loam, 6 to 10 percent slopes. This soil is deep, sloping, and moderately well drained. It is on upland side slopes. Slopes are 100 to 300 feet long. The areas of this soil are long and narrow or irregularly oval. They range from about 5 to 20 acres.

Typically, the surface layer of this soil is light yellowish brown silt loam about 5 inches thick. The subsoil extends to a depth of at least 72 inches. It is yellowish brown silty clay loam in the upper 11 inches and strong brown silty clay in the next 12 inches. It is mottled brown, gray, red, and yellow silty clay below a depth of 28 inches.

Included with this soil in mapping are small areas of well drained Aycock soils and moderately well drained Montross soils. The Aycock soils are on the higher areas of the unit, and the Montross soils are on side slopes. Included soils make up about 10 percent of this unit.

The permeability of this Ackwater soil is slow, and the available water capacity is moderate. Surface runoff is rapid. The erosion hazard is severe. The subsoil has a high shrink-swell potential. The root zone commonly extends to a depth of 60 inches or more. The soil is low in organic matter content and natural fertility. It mainly ranges from extremely acid through strongly acid, but reaction of the surface layer varies because of local liming practices. A seasonal high water table is perched at a depth of 1-1/2 to 3 feet during winter and early spring.

Most areas of this soil are in woodland. A few areas are farmed.

This soil is moderately well suited to cultivated crops and well suited to pasture and hay. The erosion hazard is severe. After heavy rains, a crust forms on the surface, and the surface layer becomes compacted. The need for lime and fertilizer to offset the acidity and low natural fertility and the need for erosion control are the main management concerns. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops and grasses and legumes in the cropping system; keeping crop residue on or in the soil; and contour tillage. All help to reduce runoff and control erosion, maintain organic matter content and tilth, reduce crusting, and increase water infiltration in the soil.

Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is too wet compact the surface layer and damage the stands of grasses and legumes, resulting in increased runoff and erosion.

The potential productivity for trees on this soil is moderately high, especially for loblolly pine, southern red oak, white oak, and sweetgum. Seeds and seedlings survive and grow well if competing vegetation is controlled. The soil is soft when wet, thus limiting the use of heavy timber equipment.

The seasonal high water table, slope, and the high shrink-swell potential and slow permeability of the subsoil are the main limitations of the soil for community development. They limit the use of the soil as a building site, as a site for sanitary landfills or septic tank absorption fields, and for some types of recreation. The soil has low strength as a subgrade material for local roads and streets.

The capability subclass is IIIe.

2C3—Ackwater silty clay loam, 6 to 10 percent slopes, severely eroded. This soil is deep, sloping, and moderately well drained. It is on upland side slopes that are dissected by drainageways. Slopes are 100 to 250 feet long. The areas of this soil are long and narrow or oval. They range from about 5 to 20 acres.

Typically, the surface layer of this soil is yellowish brown silty clay loam about 5 inches thick. The subsoil extends to a depth of at least 60 inches. It is yellowish brown and strong brown silty clay in the upper 19 inches, and is mottled brown, gray, red, and yellow silty clay below a depth of 24 inches.

Included with this soil in mapping are small areas of well drained Aycock soils and moderately well drained Montross soils. The Aycock soils are on the higher areas of the unit, and the Montross soils are on side slopes. Also included are areas along small drainageways of soils that are not so well drained as this Ackwater soil. Included soils make up about 10 percent of this unit.

The permeability of this Ackwater soil is slow, and the available water capacity is moderate. Surface runoff is rapid. The erosion hazard is severe. The subsoil has a high shrink-swell potential. The root zone commonly extends to a depth of 60 inches or more. The soil is low in organic matter content and natural fertility. It mainly ranges from extremely acid through strongly acid, but reaction of the surface layer varies because of local liming practices and erosion. A seasonal high water table is perched at a depth of 1-1/2 to 3 feet during winter and early spring.

Most areas of this soil are in woodland. A few areas are farmed.

This soil is poorly suited to cultivated crops but is moderately well suited to pasture and hay. The erosion hazard is severe. After heavy rains, a crust forms on the surface, and the surface layer becomes compacted. The need to increase organic matter content, the need for lime and fertilizer to offset the acidity and low natural fertility, and the need for erosion control are the main management concerns. The main management practices in cultivated areas are: using a conservation tillage

system that includes no-till farming, strip tillage, and stubble mulching; using cover crops and grasses and legumes in the cropping system; keeping crop residue on or in the soil; and using contour tillage. All help to reduce runoff and control erosion, maintain organic matter content and tilth, reduce clodding, and increase water infiltration in the soil.

Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is too wet compact the surface layer and damage the stands of grasses and legumes, increasing runoff and erosion.

The potential productivity on this soil is moderately high for loblolly pine. Seeds and seedlings survive and grow moderately well if competing vegetation is controlled. The soil is soft when wet, thus limiting the use of heavy timber equipment.

The seasonal high water table, slope, and the high shrink-swell potential and slow permeability of the subsoil are the main limitations of the soil for community development. They limit the use of the soil as a building site, as a site for sanitary landfills or septic tank absorption fields, and for some types of recreation. The soil has low strength as a subgrade material for local roads and streets.

The capability subclass is IVe.

2D3—Ackwater silty clay loam, 10 to 25 percent slopes, severely eroded. This soil is deep, moderately steep to steep, and moderately well drained. It is on upland side slopes that are dissected by drainageways. Slopes are 75 to 150 feet long. The areas of this soil are long and narrow or oval. They range from about 5 to 15 acres.

Typically, the surface layer of this soil is yellowish brown silty clay loam about 5 inches thick. The subsoil extends to a depth of at least 60 inches. It is yellowish brown and strong brown silty clay in the upper 15 inches, and mottled brown, gray, red, and yellow silty clay below a depth of 20 inches.

Included with this soil in mapping are small areas of well drained, gently sloping Aycock soils and moderately well drained Montross soils. The Aycock soils are on the higher areas of the unit. The Montross soils are on side slopes. Also included are areas along small drainageways and at the base of toe slopes of soils that are not so well drained as this Ackwater soil. Included soils make up about 20 percent of this unit.

The permeability of this Ackwater soil is slow, and available water capacity is moderate. Surface runoff is rapid. The erosion hazard is severe. The subsoil has a high shrink-swell potential. The root zone commonly extends to a depth of 60 inches or more. The soil is low in organic matter content and natural fertility. It mainly ranges from extremely acid through strongly acid, but reaction of the surface layer varies because of local liming practices and erosion. A seasonal high water table is perched at a depth of 1-1/2 to 3 feet during winter and early spring.

Slope limits the use of farm equipment and makes this soil generally unsuited to cultivated crops and poorly suited to pasture and hay. A small acreage is in pasture. The potential productivity for trees on this soil is moderately high. Most areas are in woodland and are managed for loblolly pine, sweetgum, and oaks. However, steep slopes limit the use of heavy timber equipment. Placing logging roads and skid trails on the contour of the landscape helps to reduce runoff and control erosion.

The seasonal high water table, the high shrink-swell potential, slope, and the slow permeability are the main limitations of the soil for community development. They limit the use of the soil as a building site, as a site for sanitary landfills or septic tank absorption fields, and for most types of recreation. The soil has low strength as a subgrade material for local roads and streets.

The capability subclass is VIe.

3—Argent silt loam. This soil is deep, nearly level, and poorly drained. It is on low stream terraces in drainageways and depressions. The areas of this soil are long and narrow. They range from about 10 to 80 acres. Slopes range from 0 to 2 percent.

Typically, the surface layer of this soil is grayish brown silt loam about 6 inches thick. The subsoil is 76 inches thick. It is mostly grayish brown and gray silty clay and clay loam and has yellow and brown mottles. The substratum extends from a depth of 82 inches to at least 97 inches and is light gray sandy clay loam with yellowish brown mottles.

Included with this soil in mapping are small areas of moderately well drained Bolling soils and poorly drained Muckalee soils. The Bolling soils are on the higher areas of the unit, and the Muckalee soils are on lower areas that are subject to flooding. Also included are areas that have water on the surface after heavy rains, during winter and spring, and during prolonged wet periods the rest of the year. Included soils make up about 10 percent of this unit.

The permeability of this Argent soil is slow, and available water capacity is high. Surface runoff is very slow. The erosion hazard is slight. The subsoil has a moderate shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is low in organic matter content and medium in natural fertility. It mainly ranges from very strongly acid through medium acid to a depth of about 50 or 60 inches and is medium acid or slightly acid below that depth. Reaction of the surface layer varies, however, because of local liming practices. A seasonal high water table is at a depth of 1 foot during winter and spring.

Most areas of this soil are in woodland. A few areas are farmed.

In drained areas this soil is moderately well suited to cultivated crops and to pasture and hay. Crops respond well to lime and fertilizer, but the soil is wet and cold in spring, and wetness often interferes with the use of equipment for tillage. After heavy rains, a crust forms on the surface, and the surface layer becomes compacted. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops and grasses and legumes in the cropping system; and keeping crop residue on or in the soil. All help to maintain organic matter content and tilth, reduce crusting, and increase water infiltration.

Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is too wet cause compaction of the surface layer and damage the stands of grasses and legumes.

The potential productivity for trees on this soil is very high, especially for loblolly pine, sweetgum, and American sycamore. Seeds and seedlings survive and grow well if competing vegetation is controlled. The soil is soft when wet, thus limiting the use of heavy timber equipment.

The seasonal high water table and slow permeability are the main limitations of the soil for community development. The water table and permeability limit the use of this soil as a building site, as a site for sanitary landfills or septic tank absorption fields, and for most types of recreation.

The capability subclass is IIIw drained and VIw undrained.

4A—Aycock silt loam, 0 to 2 percent slopes. This soil is deep, nearly level, and well drained. It is on narrow to broad ridges. The areas of this soil are long and narrow or oval. They range from 5 to 50 acres.

Typically, the surface layer of this soil is dark grayish brown silt loam about 2 inches thick. The subsurface layer is light olive brown silt loam about 5 inches thick. The subsoil extends to a depth of at least 64 inches. It is yellow and brown silt loam in the upper 18 inches. The lower part of the subsoil is yellowish brown silty clay loam with bright mottles in the upper part and gray mottles below a depth of 32 inches.

Included with this soil in mapping are small areas of well drained Bonneau, Emporia, and Norfolk soils and moderately well drained Montross and Ackwater soils. The Bonneau, Emporia, and Norfolk soils are on the higher areas of the unit. The Montross soils are in slight depressions, and the Ackwater soils are adjacent to small drainageways. Also included are moderately slowly permeable soils that have a perched seasonal high water table at a depth of less than 4 feet. Included soils make up about 15 percent of this unit.

The permeability of this Aycock soil is moderate, and available water capacity is high. Surface runoff is slow. The erosion hazard is slight. The subsoil has a low shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is low in organic matter content and natural fertility. It commonly is very strongly acid or strongly acid, but reaction of the surface layer varies because of local liming practices. A seasonal high water table is perched at a depth of 4 to 6 feet during winter and spring.

About half of the acreage of this soil is farmed, and half is in woodland.

This soil is well suited to cultivated crops and to pasture and hay. Crops respond well to lime and fertilizer. After heavy rains, however, a crust forms on the surface, and the surface layer becomes compacted. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops and grasses and legumes in the cropping system; and keeping crop residue on or in the soil. All help to maintain organic matter content and tilth, reduce crusting, and increase water infiltration.

Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is too wet cause compaction of the surface layer and damage the stands of grasses and legumes.

The potential productivity for trees on this soil is high, especially for loblolly pine, sweetgum, sycamore, and oaks. Seeds and seedlings survive and grow well.

The seasonal high water table and the low strength and permeability of the subsoil are the main limitations of the soil for community development. The water table and the permeability limit the use of the soil for septic tank absorption fields. The low strength limits the use of the soil as a base for roads and streets. The subsoil is soft when wet, limiting vehicular traffic in unpaved areas.

The capability class is I.

4B—Aycock silt loam, 2 to 6 percent slopes. This soil is deep, gently sloping, and well drained. It is on narrow ridges and side slopes. The areas of this soil are long and narrow or irregularly oval. They range from about 5 to 30 acres.

Typically, the surface layer of this soil is dark grayish brown silt loam about 2 inches thick. The subsurface layer is light olive brown silt loam about 5 inches thick. The subsoil extends to a depth of at least 64 inches. It is yellow and brown silt loam in the upper 18 inches. The lower part of the subsoil is yellowish brown silty clay loam with bright mottles in the upper part and gray mottles below a depth of 32 inches.

Included with this soil in mapping are small areas of well drained Norfolk and Emporia soils and moderately well drained Montross and Ackwater soils. The Norfolk and Emporia soils are on ridges and points of ridges. The Montross soils are in slight depressions, and the Ackwater soils are adjacent to small drainageways. Also included are moderately slowly permeable soils that have a perched seasonal high water table at a depth of less than 4 feet. Included soils make up about 15 percent of this unit.

The permeability of this Aycock soil is moderate, and available water capacity is high. Surface runoff is medium. The erosion hazard is moderate. The subsoil has a low shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is low in organic matter content and natural fertility. It commonly is very strongly acid or strongly acid, but reaction of the surface layer varies because of local liming practices. A seasonal high water table is perched at a depth of 4 to 6 feet during winter and spring.

About half of the acreage of this soil is farmed, and half is in woodland.

This soil is well suited to cultivated crops and to pasture and hay. The erosion hazard is moderate. After heavy rains, a crust forms on the surface, and the surface layer becomes compacted. The need to increase organic matter content, the need for lime and fertilizer to offset the acidity and low natural fertility, and the need for erosion control are main management concerns. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops and grasses and legumes in the cropping system; keeping crop residue on or in the soil; and contour tillage. All help to reduce runoff and control erosion, maintain organic matter content and tilth, reduce crusting, and increase water infiltration.

Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is too wet compact the surface layer and damage the stands of grasses and legumes, increasing the erosion hazard.

The potential productivity for trees on this soil is high, especially for loblolly pine, sweetgum, sycamore, and oaks. Seeds and seedlings survive and grow well.

The seasonal high water table and the low strength and permeability of the subsoil are the main limitations of the soil for community development. The water table and the permeability limit the use of the soil as a site for septic tank absorption fields. The low strength limits the use of the soil as a base for roads and streets. The subsoil is soft when wet, limiting vehicular traffic in unpaved areas.

The capability subclass is IIe.

5—Bojac loamy sand. This soil is deep, nearly level, and well drained. It is on low stream terraces. The areas of this soil commonly are broad and irregularly shaped. They range from about 10 to 40 acres. Slopes range from 0 to 4 percent.

Typically, the surface layer of this soil is dark brown loamy sand about 9 inches thick. The subsoil is 44 inches thick. It is strong brown and yellowish red fine sandy loam, sandy clay loam, and loamy sand. The substratum is strong brown sand that extends to a depth of at least 64 inches.

Included with this soil in mapping are small areas of well drained Pamunkey soils and moderately well drained Bolling soils. The Pamunkey soils are on the higher areas of the unit, and the Bolling soils are in swales and near shallow drainageways. Also included is about 100 acres along the James River of soils that have a surface layer of loamy sand about 20 inches thick. Included soils make up about 15 percent of this unit.

The permeability of this Bojac soil is moderately rapid, and available water capacity is low. Surface runoff is very slow. The hazard of water erosion is slight. The wind erosion hazard is moderate. The subsoil has a low shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is low in organic matter content and medium in natural fertility. It commonly is slightly acid or neutral, but reaction of the surface layer varies because of local liming practices. A seasonal high water table is at a depth of 4 to 6 feet during the fall and spring.

Most areas of this soil are farmed. A few small areas are in woodland.

This soil is well suited to cultivated crops and to pasture and hay. Crops generally respond well to lime and fertilizer, but response is sometimes limited by the low available water capacity. Wind erosion in the spring often damages or covers small plants. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops and grasses and legumes in the cropping system; and keeping crop residue on or in the soil. All help to maintain organic matter content and tilth, reduce erosion and crop damage, and improve moisture in the soil.

Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing causes compaction of the surface layer and damages the stands of grasses and legumes.

The potential productivity for trees on this soil is moderately high, especially for southern red oak, loblolly pine, sweetgum, and Virginia pine. Seeds and seedlings survive and grow well.

The seasonal high water table, moderately rapid permeability, and coarse texture of the soil are the main limitations for community development. The high water

table and the permeability limit use of the soil as a site for septic tank absorption fields, sewage lagoons, or sanitary landfills. The coarse texture causes a hazard of sloughing in excavations and limits use of the soil for lawns because of droughty conditions.

The capability subclass is IIs.

6—Bolling silt loam. This soil is deep, nearly level, and moderately well drained. It is in slight depressions and shallow drainageways on low stream terraces. The areas of this soil commonly are long and narrow or irregularly oval. They range from about 3 to 10 acres. Slopes range from 0 to 2 percent.

Typically, the surface layer of this soil is dark yellowish brown silt loam about 8 inches thick. The subsoil extends to a depth of at least 63 inches. The upper 4 inches is yellowish brown silt loam. The lower part is mostly brown silty clay loam, clay loam, and loam and has gray mottles.

Included with this soil in mapping are small areas of well drained Pamunkey soils and poorly drained Argent soils. The Pamunkey soils are on the higher areas of the unit, and the Argent soils are in depressions and near large drainageways. Included soils make up about 10 percent of the unit.

The permeability of this Bolling soil is moderate, and available water capacity is high. Surface runoff is slow. The erosion hazard is slight. The soil has a low shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is low in organic matter content and medium in natural fertility. The surface layer and upper part of the subsoil commonly are slightly acid or neutral, but the reaction varies because of local liming practices. The lower part of the subsoil commonly is strongly acid. A seasonal high water table is at a depth of 1-1/2 to 2-1/2 feet during winter and spring. The soil is occasionally flooded for very brief periods during winter and spring.

Most areas of this soil are farmed. A few areas are in woodland.

This soil is well suited to cultivated crops and to pasture and hay. A few areas, however, require drainage. Crops respond well to lime and fertilizer but are occasionally damaged by very brief flooding during the growing season. The soil is wet and cold in spring, and wetness often interferes with the use of equipment for tillage and harvesting. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops and grasses and legumes in the cropping system; and keeping crop residue on or in the soil. All help to maintain organic matter content and tilth, reduce crusting, and increase water infiltration.

Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is too wet cause compaction of the surface layer and damage the stand of grasses and legumes.

The potential productivity for trees on this soil is high, especially for loblolly pine, yellow-poplar, and black walnut. Seeds and seedlings survive and grow well if competing vegetation is controlled. The soil is soft when wet, thus limiting the use of heavy timber equipment.

The seasonal high water table and occasional flooding are the main limitations of the soil for community development. Both limit the use of the soil as a site for septic tanks, as a site for buildings and roads, and for most types of recreation. The soil has low strength as a subgrade material for roads and streets.

The capability subclass is IIw.

7B—Bonneau loamy sand, 0 to 6 percent slopes. This soil is deep, nearly level to gently sloping, and well drained. It is on upland ridges and side slopes. The areas of this soil commonly are long and narrow or circular. They range from about 3 to 50 acres.

Typically, the surface layer of this soil is grayish brown loamy sand about 11 inches thick. The subsurface layer is light yellowish brown loamy sand 14 inches thick. The subsoil extends to a depth of at least 80 inches. It is yellowish brown fine sandy loam between depths of 25 and 43 inches. At a depth of more than 43 inches it is yellowish brown sandy clay loam with gray and brown mottles.

Included with this soil in mapping are small areas of well drained Norfolk and Emporia soils and moderately well drained Slagle and Burrowsville soils. The Norfolk and Emporia soils are on ridges and side slopes, the Slagle soils are in slight depressions and are adjacent to drainageways, and the Burrowsville soils are on low ridges and toe slopes. Also included are small areas of soils that have less clay in the subsoil than does this Bonneau soil. Included soils make up about 15 percent of this unit.

The permeability of this Bonneau soil is moderate, and available water capacity is low to moderate. Surface runoff is slow. The hazard of water erosion is slight. The wind erosion hazard is moderate. The subsoil has a low shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is low in organic matter content and natural fertility. It commonly is very strongly acid or strongly acid, but reaction of the surface layer varies because of local liming practices. A seasonal high water table is at a depth of 3-1/2 to 5 feet during winter and early spring.

More than one half of the acreage this soil is farmed, and the rest is in woodland.

This soil is well suited to cultivated crops and moderately well suited to pasture and hay. The soil is droughty during the growing season, and crop response to lime and fertilizer is often limited by low available

water capacity. The wind erosion hazard is moderate and is a major management concern, especially during the early part of the growing season for row crops. Blowing soil often damages or covers small plants. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops and grasses and legumes in the cropping system; and keeping crop residue on or in the soil. All help to maintain organic matter content and tilth, reduce erosion and crop damage, and hold moisture in the soil.

Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing cuts the soft surface layer and damages the stands of grasses and legumes, thereby increasing the erosion hazard.

The potential productivity for trees on this soil is high, especially for loblolly pine, sweetgum, and oaks. The survival of seeds and seedlings is often limited by the low available water capacity during the growing season.

The permeability of the subsoil, the sandy texture of the surface layer, and the seasonal high water table are the main limitations of the soil for community development. The permeability and seasonal high water table limit the use of the soil as a site for sewage lagoons, septic tank absorption fields, and sanitary landfills. The sandy texture causes a hazard of sloughing and caving in excavations and has a low moisture holding capacity, limiting the growth of grasses and shrubs.

The capability subclass is IIs.

7C—Bonneau loamy sand, 6 to 10 percent slopes. This soil is deep, sloping, and well drained. It is on upland side slopes. The areas of this soil commonly are long and winding and have smooth, convex slopes about 75 to 200 feet long. The areas range from about 5 to 30 acres.

Typically, the surface layer of this soil is grayish brown loamy sand about 11 inches thick. The subsurface layer is light yellowish brown loamy sand 14 inches thick. The subsoil extends to a depth of at least 80 inches. It is yellowish brown fine sandy loam between depths of 25 and 43 inches. At a depth of more than 43 inches it is yellowish brown sandy clay loam with gray and brown mottles.

Included with this soil in mapping are small areas of well drained Emporia soils and moderately well drained Slagle soils. The Emporia and Slagle soils are on side slopes, and the Slagle soils also are adjacent to drainageways. Also included are small areas that have less clay in the subsoil than does this Bonneau soil. Included soils make up about 15 percent of this unit.

The permeability of this Bonneau soil is moderate, and available water capacity is low to moderate. Surface runoff is medium. The erosion hazard from wind and water is moderate. The subsoil has a low shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is low in organic matter content and natural fertility. It commonly is very strongly acid or strongly acid, but reaction of the surface layer varies because of local liming practices. A seasonal high water table is at a depth of 3-1/2 to 5 feet during winter and early spring.

Most of the acreage this soil is in woodland. A few areas are farmed.

This soil is moderately well suited to cultivated crops and to pasture and hay. Crop response to lime and fertilizer is sometimes limited during the growing season because of the low moisture holding capacity. The moderate erosion hazard is a major management concern. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops and grasses and legumes in the cropping system; contour tillage, and keeping crop residue on or in the soil. All help to maintain organic matter content and tilth, control erosion, and hold moisture in the soil.

Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing cuts the surface layer and damages the stands of grasses and legumes, thereby increasing the erosion hazard.

The potential productivity for trees on this soil is high, especially for loblolly pine, sweetgum, and oaks. The survival of seeds and seedlings is often limited by the low available water capacity during the growing season.

The sandy texture of the surface layer and the slope are the main limitations of the soil for community development. The sandy texture causes a hazard of sloughing in excavations. The low moisture holding capacity limits the growth of grasses and shrubs. Slope limits the use of the soil as a site for septic tank absorption fields, sewage lagoons, sanitary landfills, and most types of recreation.

The capability subclass is IIIe.

8A—Burrowsville sandy loam, 0 to 2 percent slopes. This soil is deep, nearly level, and moderately well drained. It is on broad ridges. The areas of this soil commonly are long and narrow or oval. They range from about 10 to 40 acres.

Typically, the surface layer of this soil is grayish brown sandy loam about 3 inches thick. The subsurface layer is light yellowish brown sandy loam about 11 inches thick. The subsoil is 37 inches thick. The upper 11 inches of the subsoil is light yellowish brown sandy loam with brown mottles. The next 13 inches is a firm layer of yellowish brown sandy loam with brown and gray

mottles. The lower 13 inches of the subsoil is strong brown sandy clay loam with red mottles. The substratum is mottled, strong brown sandy clay loam that extends to a depth of at least 70 inches.

Included with this soil in mapping are small areas of well drained Bonneau and Emporia soils and moderately well drained Slagle soils. The Bonneau and Emporia soils are on the higher parts of the unit, and the Slagle soils are in swales and near shallow drainageways. Also included are small areas of soils in which the upper part of the subsoil is sandy clay loam and small areas that do not have a firm layer in the subsoil. Included soils make up about 20 percent of this unit.

The permeability of this Burrowsville soil is slow, and available water capacity is moderate. Surface runoff is slow. The erosion hazard is slight. The subsoil has a low shrink-swell potential. The root zone mostly extends to a depth of about 25 inches, but it is deeper in areas that do not have the firm layer in the subsoil. The soil is low in organic matter content and natural fertility. It ranges from extremely acid through strongly acid, but reaction of the surface layer varies because of local liming practices. A seasonal high water table is perched at a depth of 1-1/2 to 3 feet during winter and early spring.

Most areas of this soil are in woodland, and a few are farmed.

This soil is moderately well suited to cultivated crops and to pasture and hay. Crops respond well to lime and fertilizer. The soil, however, sometimes is wet in early spring or droughty during periods of low rainfall. After heavy rains, a crust forms on the surface, and the surface layer becomes compacted. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops and grasses and legumes in the cropping system; and keeping crop residue on or in the soil. All help to maintain organic matter content and tilth, reduce crusting, and improve moisture in the soil.

Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is too wet compact the surface layer and damage the stands of grasses and legumes.

The potential productivity for trees on this soil is moderately high, especially for loblolly pine. Seeds and seedlings survive and grow well if competing vegetation is controlled. The soil is soft when wet, limiting the use of heavy timber equipment.

The seasonal high water table and slow permeability are the main limitations of the soil for community development. Both limit the use of the soil as a site for buildings, sanitary landfills, septic tank absorption fields, and most types of recreation.

The capability subclass is IIw.

8B—Burrowsville sandy loam, 2 to 6 percent slopes. This soil is deep, gently sloping, and moderately well drained. It is on narrow ridges and side slopes. Slopes range from about 100 to 300 feet long. The areas of this soil commonly are long and narrow or oval. They range from about 5 to 20 acres.

Typically, the surface layer of this soil is grayish brown sandy loam about 3 inches thick. The subsurface layer is light yellowish brown sandy loam about 11 inches thick. The subsoil is 37 inches thick. The upper 11 inches of the subsoil is light yellowish brown sandy loam with brown mottles. The next 13 inches is a firm layer of yellowish brown sandy loam with brown and gray mottles. The lower 13 inches of the subsoil is strong brown sandy clay loam with red mottles. The substratum is mottled, strong brown sandy clay loam that extends to a depth of at least 70 inches.

Included with this soil in mapping are small areas of well drained Bonneau and Emporia soils and moderately well drained Slagle soils. The Bonneau and Emporia soils are on the higher parts of the unit, and the Slagle soils are in swales and near shallow drainageways. Also included are small areas of soils in which the upper part of the subsoil is sandy clay loam and small areas that do not have a firm layer in the subsoil. Included soils make up about 20 percent of this unit.

The permeability of this Burrowsville soil is slow, and available water capacity is moderate. Surface runoff is medium. The erosion hazard is moderate. The subsoil has a low shrink-swell potential. The root zone mostly extends to a depth of about 25 inches, but it is deeper in areas that do not have the firm layer in the subsoil. The soil is low in organic matter content and natural fertility. It ranges from extremely acid through strongly acid, but reaction of the surface layer varies because of local liming practices. A seasonal high water table is perched at a depth of 1-1/2 to 3 feet during winter and early spring.

Most areas of this soil are in woodland, and a few are farmed.

This soil is moderately well suited to cultivated crops and to pasture and hay. Crops respond well to lime and fertilizer. The soil, however, sometimes is wet in early spring or droughty during periods of low rainfall. After heavy rains, a crust forms on the surface, and the surface layer becomes compacted. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops and grasses and legumes in the cropping system; and keeping crop residue on or in the soil. All help to maintain organic matter content and tilth, reduce crusting, control erosion, and improve moisture in the soil.

Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to

increase the carrying capacity of pastures. Overgrazing and grazing when the soil is wet compact the surface layer and damage the stands of grasses and legumes.

The potential productivity for trees on this soil is moderately high, especially for loblolly pine. Seeds and seedlings survive and grow well if competing vegetation is controlled. The soil is soft when wet, limiting the use of heavy timber equipment.

The seasonal high water table and slow permeability are the main limitations of the soil for community development. Both limit the use of the soil as a site for buildings, sanitary landfills, septic tank absorption fields, and most types of recreation.

The capability subclass is IIe.

9—Catpoint fine sand. This soil is deep, nearly level to gently sloping, and somewhat excessively drained. It is on low-lying terraces near major drainageways. The areas of this soil commonly are long and narrow and are parallel to large streams and drainageways. The areas range from about 5 to 10 acres. Slopes range from 0 to 4 percent.

Typically, the surface layer of this soil is dark brown fine sand about 9 inches thick. The underlying layers extend to a depth of at least 84 inches. They are mostly yellow and brown fine sand and gray sand that have thin layers of strong brown sandy loam at a depth of 22 to 32 inches.

Included with this soil in mapping are small areas of Muckalee soils in slight depressions adjacent to smaller drainageways and to the James River. They make up about 5 percent of this unit.

The permeability of this Catpoint soil is rapid, and available water capacity is low. Surface runoff is slow. The erosion hazard from water is slight. The wind erosion hazard is moderate. The substratum has a low shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is low in organic matter content and natural fertility. It ranges from very strongly acid through slightly acid, but reaction of the surface layer varies because of local liming practices. A seasonal high water table is at a depth of 4 to 6 feet during winter and spring.

Most areas of this soil are in woodland. A few areas are farmed.

This soil is moderately well suited to cultivated crops and to pasture and hay. The soil is droughty during the growing season, and crop response to lime and fertilizer is limited by the low available water capacity. The wind erosion hazard is moderate and is a major management concern, especially during the early part of the growing season. Blowing soil often damages or covers small plants. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops and grasses and legumes in the cropping system; and keeping crop residue on or in the soil. All help to increase organic matter content and maintain tilth, reduce erosion and crop damage, and improve the moisture holding capacity of the soil.

Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing damages the stands of grasses and legumes, thereby increasing the erosion hazard.

The potential productivity for trees on this soil is moderately high, especially for loblolly pine. The survival of seeds and seedlings is limited by low available water capacity during the growing season.

The sandy texture of the soil and the seasonal high water table are the main limitations for community development. Both cause a hazard of ground-water pollution in areas used for sewage lagoons, septic tank absorption fields, and sanitary landfills. The soil is a good source of subgrade material for local roads and streets.

The capability subclass is IIIs.

10—Chickahominy silt loam. This soil is deep, nearly level, and poorly drained. It is on broad, low-lying flats and in slight depressions in stream terraces. The areas of this soil are irregularly shaped or oval and range from about 3 to 80 acres. Slopes range from 0 to 2 percent.

Typically, the surface layer of this soil is grayish brown silt loam about 2 inches thick. The subsurface layer is light brownish gray silt loam about 5 inches thick. The subsoil extends to a depth of at least 68 inches. It is light brownish gray silty clay loam and gray clay with yellowish brown mottles.

Included with this soil in mapping are small areas on the higher parts of the unit of moderately well drained Peawick soils and somewhat poorly drained Newflat soils. Also included are soils that have water on the surface during winter and early spring and during periods of prolonged rainfall. Included soils make up about 15 percent of the unit.

The permeability of this Chickahominy soil is very slow, and available water capacity is moderate. Surface runoff is slow. The erosion hazard is slight. The subsoil has a high shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is low in organic matter content and natural fertility. It mainly is extremely acid or very strongly acid, but reaction of the surface layer varies because of local liming practices. A seasonal high water table is at a depth of 1/2 foot during winter and spring.

This soil is poorly suited to cultivated crops and moderately suited to pasture and hay. Providing drainage is a major management concern. Crops respond well to lime and fertilizer. The soil is wet and cold in spring, however, and wetness often interferes with tillage and damages crops. After heavy rains, a crust forms on the surface, and the surface layer becomes compacted. The

main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops and grasses and legumes in the cropping system; and keeping crop residue on or in the soil. All help to maintain organic matter content and tilth, reduce crusting and clodding, and increase water infiltration.

Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is wet compact the surface layer and damage the stands of grasses and legumes.

The potential productivity for trees on this soil is high, especially for loblolly pine, sweetgum, and sycamore. Most areas of this soil are in woodland. Seeds and seedlings survive and grow well if competing vegetation is controlled. The soil is soft when wet, thus limiting the use of heavy timber equipment.

The seasonal high water table, the very slow permeability, and the high shrink-swell potential of the subsoil are the main limitations of the soil for community development. All three limit the use of this soil as a site for buildings, sanitary landfills, septic tank absorption fields, and most types of recreation.

The capability subclass is IVw undrained and IIIw drained.

11B—Emporia fine sandy loam, 2 to 6 percent slopes. This soil is deep, gently sloping, and well drained. It is on uplands between drainageways and is on side slopes. Slopes are smooth and are 150 to 300 feet long. The areas of this soil commonly are long and winding or oval. They range from about 5 to 50 acres.

Typically, the surface layer of this soil is dark grayish brown fine sandy loam about 8 inches thick. The subsoil is 42 inches thick. It is yellowish brown loam, clay loam, and sandy clay loam and has gray mottles below a depth of 40 inches. The substratum is mottled, yellowish brown sandy clay loam to a depth of at least 64 inches.

Included with this soil in mapping are small areas of well drained Bonneau and Norfolk soils and moderately well drained Burrowsville and Slagle soils. The Bonneau soils are on uplands and side slopes. The Burrowsville soils are on low ridges and toe slopes. The Norfolk soils are on the higher, nearly level areas of the unit, and the Slagle soils are in slight depressions. Also included are small areas of soils with a subsoil of sandy loam. Included soils make up about 20 percent of this unit.

The permeability of this Emporia soil is moderate in the upper part of the subsoil and moderately slow in the lower part. The available water capacity is moderate. Surface runoff is medium. The erosion hazard is moderate. The subsoil has a moderate shrink-swell potential. The root zone extends to a depth of 60 inches or more but is somewhat restricted by a thin, compact layer at a depth of about 40 inches. The soil is low in organic matter content and natural fertility. It commonly is very strongly acid or strongly acid, but reaction of the surface layer varies because of local liming practices. A seasonal high water table is perched at a depth of 3 to 4-1/2 feet during winter and spring.

About half of the acreage of this soil is farmed, and half is in woodland.

This soil is well suited to cultivated crops (fig. 5) and to pasture and hay. Crops respond well to lime and fertilizer. The moderate erosion hazard is a major management concern. After heavy rains, a crust forms on the surface, and the surface layer becomes compacted. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops and grasses and legumes in the cropping system; and keeping crop residue on or in the soil. All help to maintain organic matter content and tilth, control erosion, reduce crusting, and improve water infiltration.

Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is too wet cause compaction of the surface layer and an increase in runoff and erosion.

The potential productivity for trees on this soil is moderately high, especially for loblolly pine, sweetgum, red oak, and white oak. Seeds and seedlings survive and grow well if competing vegetation is controlled.

The low strength of the soil and the moderate shrink-swell potential, seasonal high water table, and moderately slow permeability are the main limitations for community development. The low strength and shrink-swell potential limit use of the soil as a building site. The low strength further limits vehicular traffic on wet, unpaved areas. The permeability and high water table limit use of this soil as a site for septic tank absorption fields, sewage lagoons, trench-type sanitary landfills, and some types of recreation.

The capability subclass is IIe.

11C—Emporia fine sandy loam, 6 to 10 percent slopes. This soil is deep, sloping, and well drained. It is on side slopes. Slopes are smooth, commonly convex, and 80 to 200 feet long. The areas of this soil commonly are long and winding. They range from about 5 to 30 acres.

Typically, the surface layer of this soil is dark grayish brown fine sandy loam about 7 inches thick. The subsoil is 38 inches thick. It is yellowish brown loam, clay loam, and sandy clay loam and has gray mottles below a depth of 40 inches. The substratum is mottled, yellowish brown sandy clay loam to a depth of at least 64 inches.

Included with this soil in mapping are small areas of well drained Bonneau soils and moderately well drained

Figure 5.—Peanut plants on an area of Emporia fine sandy loam, 2 to 6 percent slopes.

Ackwater and Slagle soils. The Bonneau soils are on small knolls, and the Ackwater and Slagle soils are on side slopes throughout the map unit. Also included are areas that have seep spots at the base of toe slopes. Included soils make up about 20 percent of this unit.

The permeability of this Emporia soil is moderate in the upper part of the subsoil and moderately slow in the lower part. The available water capacity is moderate. Surface runoff is rapid. The erosion hazard is severe. The subsoil has a moderate shrink-swell potential. The root zone extends to a depth of 60 inches or more but is somewhat restricted by a thin, compact layer at a depth of about 35 inches. The soil is low in organic matter content and natural fertility. It commonly is very strongly acid or strongly acid, but reaction of the surface layer varies because of local liming practices. A seasonal high water table is perched at a depth of 3 to 4-1/2 feet during winter and spring.

Most of this soil is in woodland. A small acreage is cultivated or used for pasture.

This soil is moderately well suited to cultivated crops and to pasture and hay. Crops respond well to lime and fertilizer. The severe erosion hazard is a major management concern. After heavy rains, a crust forms on the surface, and the surface layer becomes compacted. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops and grasses and legumes in the cropping system; contour tillage; and keeping crop residue on or in the soil. All help to maintain organic matter content and tilth, control erosion, reduce crusting, and increase water infiltration. Grassed waterways and diversions further help to control rapid runoff and reduce erosion.

The soil is moderately well suited to pasture. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to

increase the carrying capacity of pastures. Overgrazing and grazing when the soil is too wet cause compaction of the surface layer and an increase in runoff and erosion.

The potential productivity for trees on this soil is moderately high, especially for loblolly pine, sweetgum, and southern red oak. Seeds and seedlings survive and grow well if competing vegetation is controlled.

The low strength and slope of the soil and the moderate shrink-swell potential, moderately slow permeability, and seasonal high water table are the main limitations for community development. Slope, the seasonal high water table, and the shrink-swell potential limit use of the soil as a building site. The low strength limits vehicular traffic on wet, unpaved areas. Slope, seasonal wetness, and the permeability limit use of the soil as a site for septic tank absorption fields, sanitary landfills, and some types of recreation.

The capability subclass is IIIe.

12F—Emporia soils, 15 to 45 percent slopes. These soils are deep, moderately steep to very steep, and well drained. They are on side slopes along rivers, creeks, and drainageways. The total acreage of this unit is about 45 percent Emporia fine sandy loam, 35 percent soils that are similar to Emporia soils, and 20 percent other soils. The soils were mapped together because they have no major difference in use and management. Slopes are convex and range from 50 to 250 feet long. The areas of these soils are long and winding, and they range from about 5 to 100 acres.

Typically, the surface layer of the Emporia soils is dark grayish brown fine sandy loam about 6 inches thick. The subsoil is 39 inches thick. It is yellowish brown loam, clay loam, and sandy clay loam with gray mottles at a depth of more than 40 inches. The substratum is mottled, yellowish brown, yellowish red, and gray sandy clay loam and sandy loam to a depth of at least 64 inches.

Included with these soils in mapping are small areas of moderately well drained Slagle soils, somewhat poorly drained Lynchburg soils, and poorly drained Kinston soils. The Slagle and Lynchburg soils are gently sloping and are near the heads of drainageways. The Kinston soils are in small drainageways and along the edges of large drainageways. Also included are soils that have a sandy subsoil and soils that have a subsoil of clay. Small areas of gravelly or severely eroded soils are on some knobs and short, steep slopes. Some areas, especially at the base of the slopes, have springs or seeps.

The permeability of these Emporia soils is moderately slow, and available water capacity is moderate. Surface runoff is very rapid. The erosion hazard is severe. The subsoil has a moderate shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is low in organic matter content and natural fertility. It commonly is very strongly acid or strongly acid. A seasonal high water table is perched at a depth of 3 to 4-1/2 feet during winter and spring.

Slope limits the use of farm equipment and makes these soils generally unsuitable for farming. The potential productivity for trees on these soils is moderately high. Most areas are in woodland and are managed for loblolly pine, sweetgum, and oaks. However, slope also limits the operation of heavy timber equipment. Placing logging roads and skid trails on the contour of the landscape helps to reduce the runoff and control erosion.

Slope is the main limitation of these soils for community development, especially for roads and streets, recreation sites, building sites, and septic tank absorption fields.

The capability subclass is VIIe.

13D—Emporia and Slagle soils, 6 to 15 percent slopes. These soils are deep and sloping to moderately steep. They are on side slopes along rivers, creeks, and drainageways. Some areas consist mostly of well drained Emporia soils, some mostly of moderately well drained Slagle soils, and some of both. The Emporia and Slagle soils were mapped together because they have no major differences in use and management. The total acreage of the unit is about 45 percent Emporia soils, 35 percent Slagle soils, and 20 percent other soils. Slopes are about 150 to 400 feet long. The areas commonly are long and winding. They range from about 5 to 30 acres.

Typically, the surface layer of the Emporia soils is dark grayish brown fine sandy loam about 6 inches thick. The subsoil is 39 inches thick. It is yellowish brown loam, clay loam, and sandy clay loam with gray mottles at a depth of more than 40 inches. The substratum is mottled, yellowish red, yellowish brown, and gray sandy clay loam and sandy loam to a depth of at least 64 inches.

The surface layer of Slagle soils is grayish brown sandy loam about 8 inches thick. The subsoil is 40 inches thick. The upper part is yellowish brown sandy loam and sandy clay loam; the next part is light yellowish brown sandy clay loam with strong brown and gray mottles; and the lower part is mottled, light gray sandy clay loam. The substratum is mottled, light gray sandy loam to a depth of at least 65 inches.

Included with these soils in mapping are small areas of somewhat poorly drained Lynchburg soils and poorly drained Kinston soils. The Lynchburg soils are at the heads of small drainageways, and the Kinston soils are in small drainageways and along the edges of large drainageways. Also included are small areas of soils that have a subsoil of clay and areas that have a subsoil of sandy loam. Some small areas of gravelly or severely eroded soils are on knobs and short, steep slopes.

The permeability of these Emporia and Slagle soils is moderate in the upper part of the subsoil and moderately slow in the lower part. The available water capacity of both soils is moderate. Surface runoff is rapid, and the

erosion hazard is severe. The subsoil of both soils has a moderate shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soils are low in organic matter content and natural fertility. They commonly are very strongly acid or strongly acid, but reaction is variable because of local liming practices. During winter and spring a seasonal high water table is perched at a depth of 3 to 4-1/2 feet in the Emporia soils and at a depth of 1-1/2 to 3 feet in the Slagle soils.

Most areas of these soils are in woodland. Some areas are in pasture, and a few areas are in urban development.

Slope limits the use of equipment and makes these soils generally unsuited to cultivated crops and poorly suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. The use of proper stocking rates, rotational and deferred grazing, and the use of lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing damages the desirable grasses and legumes and increases runoff and the hazard of erosion.

The potential productivity for trees on these soils is moderate. The common trees are loblolly pine, sweetgum, yellow-poplar, and sycamore. Seeds and seedlings survive and grow well if erosion and competing vegetation are controlled.

The seasonal high water table, slope, and the moderately slow permeability of the subsoil are the main limitations of these soils for community development, especially for building sites, sanitary facilities, and most types of recreation.

The capability subclass is IVe.

14—Kinston complex. This unit consists of deep, nearly level, poorly drained soils on flood plains and along major drainageways. The areas are long and narrow or irregularly oval. They are about 200 to 500 feet wide and are as much as 1 mile long. The areas range from about 3 to 1,000 acres. Slopes range from 0 to 2 percent. This unit is about 40 percent Kinston soils, 30 percent soils similar to Kinston soils, and 25 percent other soils. The Kinston soils and soils that are similar to the Kinston soils are so intermingled that it was not practical to map them separately.

Typically, the surface layer of the Kinston soils is dark grayish brown and light brownish gray loam about 7 inches thick. The substratum is light gray clay loam that extends to a depth of at least 62 inches.

Included with this complex in mapping are small areas of well drained Emporia soils and moderately well drained Slagle soils. The Emporia and Slagle soils are in islandlike areas throughout some units. Also included throughout the unit are poorly drained soils that have a subsoil of clay and poorly drained soils that are sandy. Some areas are flooded for a very long period, and few places have layers of weathered calcareous shells.

Permeability is moderate in the Kinston soils and slow in the soils that are similar to Kinston soils. The available water capacity of both soils is high. The shrink-swell potential is low for Kinston soils and high for some of the other soils. The root zone extends to a depth of 60 inches or more. Kinston soils have moderate organic matter content and medium natural fertility. They commonly are strongly or very strongly acid, but reaction of the surface layer varies because of sediment deposition from the higher surrounding cultivated fields. The water table is at a depth of 1 foot most of the time. Brief flooding commonly occurs during summer and early fall from intense rain storms. The areas commonly are flooded or have water on the surface from late fall to late spring.

Flooding and the high water table make this unit generally unsuited to farming (fig. 6). Most areas are in woodland. The potential productivity for trees is very high, especially for water-tolerant hardwoods such as sweetgum, blackgum, swamp tupelo, and water oak. These species generally regenerate naturally after timber harvest. Flooding and the water table are the main limitations for the use of timber harvesting equipment and preclude the use of the unit for most types of community development.

The capability subclass is VIw.

15—Levy silt loam. This soil is deep, nearly level, and very poorly drained. It is on tidal marshes. The areas are irregular in shape. They range from about 3 to 100 acres. Slopes are less than 1 percent.

Typically, the surface layer of this soil is dark gray silt loam about 6 inches thick. The substratum is dark gray and very dark grayish brown silty clay to a depth of at least 60 inches.

Included with this soil in mapping are small areas of poorly drained Muckalee soils that are on the higher areas of the unit. The Muckalee soils make up about 5 percent of this unit.

The permeability of this Levy soil is slow, and available water capacity is high. Surface runoff is very slow. The substratum has a high shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is high in organic matter content and medium in natural fertility. It is very strongly acid or strongly acid throughout. It is flooded daily by tides and covered with 2 to 18 inches of water.

The areas of this soil are in water-tolerant grasses and forbs, especially cattails, giant cordgrass, and lilies. Baldcypress and tupelo are in some areas. The soil is very soft, however, and will not support timber harvesting equipment. The water in and on the soil make this unit generally unsuitable for farming or community development.

The capability subclass is VIIw.

Figure 6.—Flooding on an area of the Kinston complex.

16—Lynchburg loam. This soil is deep, nearly level, and somewhat poorly drained. It is on broad, low-lying uplands and at the heads of drainageways. The areas of this soil commonly are oval or rectangular. They range from about 5 to 30 acres. Slopes range from 0 to 2 percent.

Typically, the surface layer of this soil is dark grayish brown loam about 9 inches thick. The subsoil extends to a depth of at least 65 inches. The upper part of the subsoil is light olive brown loam 7 inches thick. The lower part is mottled, light brownish gray loam and light gray loam and clay loam.

Included with this soil in mapping are small areas of well drained Aycock and Norfolk soils, moderately well drained Montross and Slagle soils, and poorly drained Rains soils. The Aycock, Montross, Norfolk, and Slagle soils are at the higher positions of the unit. The Rains soils are in swales, slight depressions, and shallow drainageways. Also included are areas that have water on the surface during winter and after heavy rainfall during summer. Included soils make up about 20 percent of this unit.

The permeability of this Lynchburg soil is moderate, and available water capacity is high. Surface runoff is slow. The erosion hazard is slight. The subsoil has a low shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is low in organic matter content and natural fertility. It commonly is strongly acid or very strongly acid, but reaction of the surface layer varies because of local liming practices. A seasonal high water table is at a depth of 1/2 foot to 1-1/2 feet during winter and spring.

About half of the acreage of this soil is in woodland. Most of the remaining acreage is farmed.

Drained areas of this soil are well suited to cultivated crops, and undrained areas are moderately well suited. The soil is well suited to pasture and hay. Crops respond well to lime and fertilizer. The soil is wet and cold in the spring, and wetness often interferes with tillage and harvesting. After heavy rains, a crust forms on the surface, and the surface layer becomes compacted. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops and grasses and legumes in the cropping system; and keeping crop residue on or in the soil. All help to maintain organic matter content and tilth, reduce crusting, and increase water infiltration.

Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of the pastures. Overgrazing and grazing when the soil is wet cause compaction of the surface layer and reduce the stands of desirable grasses and legumes.

The potential productivity for trees on this soil is high, especially for loblolly pine, sweetgum, yellow-poplar, sycamore, and oaks. Seeds and seedlings survive and grow well if competing vegetation is controlled. The soil is soft when wet, thus limiting the use of heavy timber harvesting equipment.

The seasonal high water table is the main limitation of the soil for community development, especially for building sites, sanitary landfills, septic tank absorption fields, and some types of recreation.

The capability subclass is IIIw undrained and IIw drained.

17—Lynchburg-Slagle complex. This unit consists of nearly level, deep Lynchburg and Slagle soils that are so intermingled that it was not practical to map them separately. The unit is about 55 percent somewhat poorly drained Lynchburg soils, 25 percent moderately well drained Slagle soils, and 20 percent other soils. The areas of the unit are at the heads of drainageways, at the base of slopes, and in shallow drainageways. They are long and narrow. They range from about 3 to 12 acres. Slopes range from 0 to 2 percent on the Lynchburg soils and 0 to 4 percent on the Slagle soils.

Typically, the surface layer of the Lynchburg soils is dark grayish brown loam about 9 inches thick. The subsoil extends to a depth of at least 65 inches. The upper part of the subsoil is light olive brown loam 7 inches thick. The lower part is mottled, light brownish gray loam and light gray loam and clay loam.

Typically, the surface layer of the Slagle soils is grayish brown sandy loam about 10 inches thick. The subsoil is 38 inches thick. The upper part is yellowish brown sandy loam and sandy clay loam; the next part is light yellowish brown sandy clay loam with strong brown and gray mottles; and the lower part is mottled, light gray sandy clay loam. The substratum is mottled, light gray sandy loam to a depth of at least 65 inches.

Included with these soils in mapping are small areas of well drained Emporia soils and poorly drained Kinston soils. The Emporia soils are on the higher areas of the unit, and the Kinston soils are in deep drainageways. Also included are small areas of soils that have a subsoil of clay or sand. Most of these included areas are covered by soil material that has been washed from higher areas.

Permeability is moderate in these Lynchburg soils and moderately slow in the Slagle soils. The available water capacity is high for both soils. Surface runoff is slow. The erosion hazard is slight. The Lynchburg soils have a low shrink-swell potential in the subsoil, and the Slagle soils have a moderate shrink-swell potential. The root zone extends to a depth of 60 inches or more. Both soils are low in organic matter content and natural fertility. Both soils commonly are very strongly or strongly acid, but reaction of the surface layer varies because of local liming practices. Lynchburg soils have a seasonal high water table at a depth of 1/2 foot to 1-1/2 feet, and Slagle soils have a seasonal high water table perched at a depth of 1-1/2 to 3 feet during winter and spring. Both soils are flooded very briefly during periods of heavy rainfall.

Most of the acreage of these soils is in woodland. Some areas are farmed.

This unit is moderately well suited to cultivated crops and to pasture and hay. Crops respond well to lime and fertilizer. Lynchburg soils commonly are wet and cold in spring, and wetness often interferes with tillage and crop harvest. Subsurface or open-ditch drainage helps to alleviate wetness and protects crops from damage. After heavy rains, a crust forms on the surface, and the surface layer becomes compacted. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops and grasses and legumes in the cropping system; and keeping crop residue on or in the soil. All help to maintain organic matter content and tilth, reduce crusting, and increase water infiltration.

Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is wet cause compaction of the surface layer and reduce the stands of desirable grasses and legumes.

The potential productivity for trees on these soils is high, especially for loblolly pine and sweetgum. Seeds and seedlings survive and grow well if competing vegetation is controlled. The soils are soft when wet, thus limiting the use of heavy timber equipment.

The seasonal high water table, low strength, and the permeability of the subsoil are the main limitations of these soils for community development. The water table and the permeability limit the use of the soils for septic tank absorption fields, sewage lagoons, sanitary landfills, building sites, and most types of recreation. Low strength limits the soils as a site for local roads.

The capability subclass is IIIw.

18A—Montross silt loam, 0 to 2 percent slopes. This soil is deep, nearly level, and moderately well drained. It is on broad upland flats crossed by shallow drainageways. The areas of this soil are long and narrow or oval. They range from about 10 to 500 acres.

Typically, the surface layer of this soil is light yellowish brown silt loam about 7 inches thick. The upper 19 inches of the subsoil is yellowish brown silt loam that is mottled in the lower part. The next 24 inches is a very firm and compact layer of yellowish brown silty clay loam with brown and gray mottles. The lower part of the subsoil is mottled, light brownish gray silty clay that extends to a depth of at least 86 inches.

Included with this soil in mapping are small areas of well drained Aycock soils and moderately well drained Ackwater soils. The Aycock soils are on the higher areas of the unit, and the Ackwater soils commonly are in the lower areas. Also included are circular areas of about 2 acres or less of poorly drained soils with a subsoil of clay. These areas are usually dry during the growing season and have water on the surface during winter and early spring. Included soils make up about 15 percent of this unit.

The permeability of this Montross soil is moderately slow, and available water capacity is moderate. Surface runoff is slow. The erosion hazard is slight. The subsoil has a moderate shrink-swell potential. The root zone extends to a depth of about 60 inches, but root growth is restricted at a depth of about 22 to 36 inches by the firm part of the subsoil. The soil is low in organic matter content and natural fertility. It mainly is extremely acid through strongly acid, but reaction of the surface layer varies because of local liming practices. A seasonal high water table is perched at a depth of 1-1/2 to 2-1/2 feet during winter and spring.

Most areas of this soil are in woodland. A few areas are farmed.

This soil is well suited to cultivated crops and to pasture and hay. Crops respond well to lime and fertilizer. After heavy rains, however, a crust forms on the surface, and the surface layer becomes compacted. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops and grasses and legumes in the cropping system; and keeping crop residue on or in the soil. All help to maintain organic matter content and tilth, reduce crusting, and increase water infiltration.

Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is too wet often compact the surface layer, which increases the erosion hazard.

The potential productivity for trees on this soil is moderately high. The soil is managed mostly for loblolly pine, but the firm layer in the subsoil restricts rooting and causes a hazard of uprooting during wet, windy periods. Seeds and seedlings survive and grow well if competing vegetation is controlled. The use of heavy timber equipment is limited by seasonal wetness.

The shallow depth to the seasonal high water table, the moderately slow permeability of the subsoil, and low strength are the main limitations of the soil for community development. The water table and permeability limit the use of this soil as a building site, as a site for sanitary landfills or septic tank absorption fields, and for many types of recreation. The soil is limited for use as a subgrade material for local roads and streets because of low strength.

The capability subclass is IIw.

18B—Montross silt loam, 2 to 6 percent slopes. This soil is deep, gently sloping, and moderately well drained. It is on narrow ridgetops and side slopes. Slopes range from 100 to 250 feet long. The areas of this soil are long and narrow or oval and range from about 5 to 20 acres.

Typically, the surface layer of this soil is light yellowish brown silt loam about 7 inches thick. The subsoil extends to a depth of at least 86 inches. The upper 19 inches of the subsoil is yellowish brown silt loam that is mottled in the lower part. The next 24 inches is a very firm and compact layer of yellowish brown silty clay loam with brown and gray mottles. The lower part of the subsoil is mottled, light brownish gray silty clay.

Included with this soil in mapping are small areas of well drained Aycock soils, moderately well drained Ackwater soils, and somewhat poorly drained Lynchburg soils. The Aycock soils are on the higher areas of the unit, and the Ackwater soils are on the lower areas. The Lynchburg soils are in depressions and at the heads of drainageways. Included soils make up about 15 percent of this unit.

The permeability of this Montross soil is moderately slow, and available water capacity is moderate. Surface runoff is medium. The erosion hazard is moderate. The subsoil has a moderate shrink-swell potential. The root zone extends to a depth of about 60 inches, but root growth is restricted at a depth of about 22 to 36 inches by the firm part of the subsoil. The soil is low in organic matter content and natural fertility. It mainly is extremely acid through strongly acid, but reaction of the surface layer varies because of local liming practices. A seasonal

high water table is perched at a depth of 1-1/2 to 2-1/2 feet during winter and spring.

Most areas of this soil are in woodland. A few areas are farmed.

This soil is well suited to cultivated crops and to pasture and hay. The moderate erosion hazard is a major management concern. After heavy rains, a crust forms on the surface, and the surface layer becomes compacted. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops and grasses and legumes in the cropping system; keeping crop residue on or in the soil; and contour tillage. All help to reduce runoff and control erosion, maintain organic matter content and tilth, reduce crusting, and increase water infiltration.

Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is wet often compact the surface layer, which increases the erosion hazard.

The potential productivity for trees on this soil is moderately high. The soil is managed mostly for loblolly pine, but the firm layer in the subsoil restricts rooting and causes a hazard of uprooting during wet, windy periods. Seeds and seedlings survive and grow well if competing vegetation is controlled. The use of heavy timber equipment is limited by seasonal wetness.

The shallow depth to the seasonal high water table, the moderately slow permeability of the subsoil, and low strength are the main limitations of the soil for community development. The water table and permeability limit the use of this soil as a building site, as a site for sanitary landfills or septic tank absorption fields, and for many types of recreation. The soil is limited for use as a subgrade material for local roads and streets because of low strength.

The capability subclass is IIe.

19—Muckalee loam. This soil is deep, nearly level, and poorly drained. It is on flood plains. The areas of this soil commonly are long and narrow. They range from about 5 to 30 acres. Slopes range from 0 to 2 percent.

Typically, the surface layer of this soil is dark gray loam about 14 inches thick. The substratum is dark gray and olive gray sandy loam to a depth of at least 60 inches.

Included with this soil in mapping are small areas of moderately well drained Bolling soils and very poorly drained Levy soils. The Bolling soils are on the higher areas of the unit; the Levy soils are on the lower areas and are flooded twice daily by tides. Included soils make up about 15 percent of this unit.

The permeability of this Muckalee soil is moderate, and available water capacity is moderate. Surface runoff is very slow. The erosion hazard is slight. The substratum has a low shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is moderate in organic matter content and medium in natural fertility. It ranges from strongly acid through medium acid in the surface layer and from medium acid through neutral in the substratum. A seasonal high water table is at a depth of 1/2 foot to 1-1/2 feet from late fall through early spring, and the soil is frequently flooded most of the year.

Most areas of this soil are in woodland. The potential productivity for trees on this soil is high, especially for loblolly pine, sweetgum, American sycamore, tupelo, water oak, and baldcypress. The seasonal high water table causes a high rate of seedling mortality for all but tupelo and baldcypress (fig. 7). The soil is soft when wet, thus limiting the use of heavy timber equipment.

The water in and on the soil makes this unit generally unsuitable for farming or community development.

The capability subclass is Vw.

20—Newflat silt loam. This soil is deep, nearly level, and somewhat poorly drained. It is on broad flats of intermediate river terraces. The areas of this soil are long and narrow. They range from 5 to 80 acres. Slopes range from 0 to 2 percent.

Typically, the surface layer of this soil is very dark gray silt loam about 2 inches thick. The subsurface layer is light brownish gray silt loam about 3 inches thick. The subsoil extends to a depth of at least 75 inches. The upper 5 inches of the subsoil is mottled, light yellowish brown clay loam. The next 30 inches is mottled, brown and gray clay loam. The lower part of the subsoil is mottled, light gray silty clay.

Included with this soil in mapping are small areas of moderately well drained Peawick soils and poorly drained Chickahominy soils. The Peawick soils are on the higher areas of the unit, and the Chickahominy soils are in shallow depressions and near drainageways. Also included are areas that have water on the surface during winter and early spring or after prolonged periods of heavy rainfall. Included soils make up about 15 percent of this unit.

The permeability of this Newflat soil is very slow, and available water capacity is moderate. Surface runoff is slow. The erosion hazard is slight. The subsoil has a high shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is low in organic matter content and natural fertility. It mainly is extremely acid or very strongly acid, but reaction of the surface layer varies because of local liming practices. A seasonal high water table is at a depth of 1/2 foot to 1-1/2 feet during winter and early spring.

Most areas of this soil are in woodland. A few areas are in pasture.

This soil is moderately well suited to cultivated crops and well suited to pasture and hay. Crops respond well to lime and fertilizer. After heavy rains, however, a crust

Figure 7.—Woodland on a flooded area of Muckalee loam.

forms on the surface, and the surface layer becomes compacted. The soil is wet and cold in spring, and wetness often interferes with tillage and harvesting. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops and grasses and legumes in the cropping system; and keeping crop residue in or on the soil. All help to maintain organic matter content and tilth, reduce crusting, and increase water infiltration.

Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is too wet compact the surface layer and damage the stands of grasses and legumes.

The potential productivity for trees on this soil is high, especially for loblolly pine, sweetgum, and red maple. Seeds and seedlings survive and grow well if competing vegetation is controlled. The soil is soft when wet, thus limiting the use of heavy timber equipment.

The seasonal high water table, the slow permeability, and the high shrink-swell potential are the main limitations of the soil for community development. They limit the use of this soil for building sites, sanitary landfills, septic tank absorption fields, and most types of recreation. The soil has low strength as a subgrade material for local roads and streets.

The capability subclass is IIIw.

21—Norfolk fine sandy loam. This soil is deep, nearly level, and well drained. It is on broad upland ridges. The areas of this soil are long and narrow or oval. They range from about 5 to 25 acres. Slopes range from 0 to 2 percent.

Typically, the surface layer of this soil is grayish brown fine sandy loam about 9 inches thick. The subsurface layer is pale brown fine sandy loam 7 inches thick. The subsoil is 54 inches thick. It is yellowish brown fine sandy loam in the upper part and mottled, yellowish brown sandy clay loam in the lower part. The substratum is mottled, sandy clay loam to a depth of at least 98 inches.

Included with this soil in mapping are small areas of well drained Bonneau and Emporia soils and moderately well drained Slagle and Burrowsville soils. The Bonneau and Emporia soils are on small knobs and upland ridges. The Slagle soils are in shallow depressions and near drainageways, and the Burrowsville soils are on foot slopes. Included soils make up about 15 percent of this unit.

The permeability of this Norfolk soil is moderate, and available water capacity is moderate. Surface runoff is slow. The erosion hazard is slight. The subsoil has a low shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is low in organic matter content and natural fertility. It commonly is very strongly acid or strongly acid, but reaction of the surface layer varies because of local liming practices. A seasonal high water table is perched at a depth of 4 to 6 feet during winter and early spring.

Most areas of this soil are farmed. A small acreage is in woodland.

This soil is well suited to cultivated crops and to pasture and hay. Crops respond well to lime and fertilizer. After heavy rains, however, a crust forms on the surface, and the surface layer becomes compacted. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops and grasses and legumes in the cropping system; and keeping crop residue on or in the soil. All help to maintain organic matter content and tilth, reduce crusting, and improve water infiltration.

Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is too wet cause compaction of the surface layer and damage the stands of grasses and legumes.

The potential productivity for trees on this soil is high, especially for loblolly pine. Seeds and seedlings survive and grow well.

The seasonal high water table and the permeability of the subsoil are the main limitations of the soil for community development, especially for septic tank absorption fields, sewage lagoons, shallow excavations, and buildings with basements.

The capability class is I.

22A—Pamunkey loam, 0 to 2 percent slopes. This soil is deep, nearly level, and well drained. It is on broad, low stream terraces. The areas of this soil commonly are long and narrow. They range from about 5 to 80 acres.

Typically, the surface layer of this soil is brown loam about 10 inches thick. The subsurface layer is yellowish brown loam 6 inches thick. The subsoil is mostly strong brown clay loam and sandy clay loam 39 inches thick. The substratum is mostly strong brown fine sandy loam to a depth of at least 72 inches.

Included with this soil in mapping are small areas of well drained Bojac soils, moderately well drained Bolling soils, and poorly drained Argent soils. The Bojac soils mainly are on the higher areas of the unit, the Bolling soils are in swales and drainageways, and the Argent soils are in small transitional areas along drainageways. Included soils make up about 15 percent of this unit.

The permeability of this Pamunkey soil is moderate in the subsoil and rapid in the substratum. Available water capacity is moderate. Surface runoff is slow. The erosion hazard is slight. The soil has a low shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is low in organic matter content and medium in natural fertility. It commonly is medium acid through neutral, but reaction of the surface layer varies because of local liming practices.

Most areas of this soil are farmed. A few areas are in woodland.

This soil is well suited to cultivated crops and to pasture and hay. Crops respond well to lime and fertilizer. After heavy rains, however, a crust forms on the surface, and the surface layer becomes compacted. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops and grasses and legumes in the cropping system; and keeping crop residue in or on the soil. All help to maintain organic matter content and tilth, reduce crusting, and increase water infiltration.

Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing damages the stands of desirable grasses and legumes, thereby increasing runoff and the erosion hazard.

The potential productivity for trees on this soil is high, especially for loblolly pine, yellow-poplar, and black walnut. Seeds and seedlings survive and grow well if competing vegetation is controlled.

The rapid permeability of the substratum and the low strength of the subsoil are the main limitations of the soil for community development. The permeability causes a hazard of ground-water pollution in areas used for sewage lagoons or sanitary landfills. The soil needs a suitable base material to provide strength and stability to support vehicular traffic.

The capability class is I.

22B—Pamunkey loam, 2 to 6 percent slopes. This soil is deep, gently sloping, and well drained. It is on broad, low stream terraces. The areas of this soil commonly are long and narrow or irregularly oval. They range from about 3 to 25 acres.

Typically, the surface layer of this soil is brown loam about 10 inches thick. The subsurface layer is yellowish brown loam 6 inches thick. The subsoil is mostly strong brown clay loam and sandy clay loam 39 inches thick. The substratum is mostly strong brown fine sandy loam to a depth of at least 72 inches.

Included with this soil in mapping are small areas of well drained Bojac soils, moderately well drained Bolling soils, and poorly drained Argent soils. The Bojac soils mainly are on the higher areas of the unit, the Bolling soils are in swales and drainageways, and the Argent soils are in small transitional areas along drainageways. Included soils make up about 10 percent of this unit.

The permeability of this Pamunkey soil is moderate in the subsoil and rapid in the substratum. Available water capacity is moderate. Surface runoff is medium. The erosion hazard is moderate. The soil has a low shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is low in organic matter content and medium in natural fertility. It commonly is medium acid through neutral, but reaction of the surface layer varies because of local liming practices.

Most areas of this soil are farmed. A few areas are in woodland.

This soil is well suited to cultivated crops and to pasture and hay. Crops respond well to lime and fertilizer. After heavy rains, however, a crust forms on the surface, and the surface layer becomes compacted. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops and grasses and legumes in the cropping system; and keeping crop residue on or in the soil. All help to maintain organic matter content and tilth, reduce crusting, increase water infiltration, and reduce erosion.

Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing damages the stands of desirable grasses and legumes, thereby increasing runoff and the erosion hazard.

The potential productivity for trees on this soil is high, especially for loblolly pine, yellow-poplar, and black walnut. Seeds and seedlings survive and grow well if competing vegetation is controlled.

The rapid permeability of the substratum and the low strength of the subsoil are the main limitations of the soil for community development. The permeability causes a hazard of ground-water pollution in areas used for sewage lagoons or sanitary landfills. The soil needs a suitable base material to provide strength and stability to support vehicular traffic.

The capability subclass is IIe.

23A—Peawick silt loam, 0 to 2 percent slopes. This soil is deep, nearly level, and moderately well drained. It is on broad ridges on high stream terraces. The areas of this soil are long and narrow or oval. They range from about 10 to 80 acres.

Typically, the surface layer of this soil is grayish brown silt loam about 3 inches thick. The subsoil extends to a depth of at least 76 inches. The upper 5 inches of the subsoil is olive yellow silty clay loam. The next 7 inches is yellowish brown silty clay. The next 35 inches of the subsoil is yellowish brown and brownish yellow, mottled clay. Gray silty clay is at a depth of more than 50 inches.

Included with this soil in mapping are small areas of well drained Wickham soils, somewhat poorly drained Newflat soils, and poorly drained Chickahominy soils. The Wickham soils are on the higher areas of the unit, and the Newflat and Chickahominy soils are on the lower areas and near drainageways. Included soils make up about 15 percent of this unit.

The permeability of this Peawick soil is very slow, and available water capacity is moderate. Surface runoff is slow. The erosion hazard is slight. The subsoil has a high shrink-swell potential. The root zone commonly extends to a depth of 60 inches or more. The soil is low in organic matter content and natural fertility. It commonly ranges from extremely acid through strongly acid, but reaction of the surface layer varies because of local liming practices. A seasonal high water table is perched at a depth of 1-1/2 to 3 feet during winter and early spring.

Most areas of this soil are in woodland. A few areas are farmed.

This soil is well suited to cultivated crops and to pasture and hay. However, the thin surface layer and the high clay content of the subsoil hinder cultivation, especially when the soil is wet. After heavy rains, a crust forms on the surface, and the surface layer becomes compacted. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops and grasses and legumes in the cropping system; and keeping crop residue on or in the soil. All help to reduce runoff and control erosion, maintain organic matter content and tilth, reduce crusting, and increase water infiltration.

Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is too wet often compact the surface layer, thereby increasing the erosion hazard.

The potential productivity for trees on this soil is moderately high, especially for loblolly pine. Seeds and seedlings survive and grow well if competing vegetation

is controlled. The use of heavy timber equipment on this soil is limited during wet periods.

The seasonal high water table and the high shrink-swell potential and the very slow permeability of the subsoil are the main limitations of the soil for community development. They limit use of the soil as a building site, as a site for sanitary landfills or septic tank absorption fields, and for many types of recreation. The soil has low strength as a subgrade material for local roads and streets.

The capability subclass is IIw.

23B—Peawick silt loam, 2 to 6 percent slopes. This soil is deep, gently sloping, and moderately well drained. It is on narrow ridges and side slopes on high stream terraces. Slopes are smooth, commonly complex, and about 100 to 300 feet long. The areas of this soil are long and narrow. They range from 5 to 80 acres.

Typically, the surface layer of this soil is grayish brown silt loam about 3 inches thick. The subsoil extends to a depth of at least 76 inches. The upper 5 inches of the subsoil is olive yellow silty clay loam. The next 7 inches is yellowish brown silty clay. The next 35 inches of the subsoil is yellowish brown and brownish yellow, mottled clay. Gray silty clay is at a depth of more than 50 inches.

Included with this soil in mapping are small areas of well drained Wickham soils, somewhat poorly drained Newflat soils, and poorly drained Chickahominy soils. The Wickham soils are on the higher areas of the unit, and the Newflat and Chickahominy soils are on lower areas and near drainageways. Included soils make up about 15 percent of this unit.

The permeability of this Peawick soil is very slow, and available water capacity is moderate. Surface runoff is medium. The erosion hazard is moderate. The subsoil has a high shrink-swell potential. The root zone commonly extends to a depth of 60 inches or more. The soil is low in organic matter content and natural fertility. It commonly ranges from extremely acid through strongly acid, but reaction of the surface layer varies because of local liming practices. A seasonal high water table is perched at a depth of 1-1/2 to 3 feet during winter and early spring.

Most areas of this soil are in woodland. A few areas are farmed.

This soil is well suited to cultivated crops and to pasture and hay. However, the thin surface layer and the high clay content of the subsoil hinder cultivation, especially when the soil is wet. After heavy rains, a crust forms on the surface, and the surface layer becomes compacted. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops and grasses and legumes in the cropping system; and keeping crop residue on or in the soil. All help to reduce runoff and control erosion, maintain organic matter content and tilth, reduce crusting, and increase water infiltration.

Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is wet often compact the surface layer, thereby increasing the erosion hazard.

The potential productivity for trees on this soil is moderately high, especially for loblolly pine. Seeds and seedlings survive and grow well if competing vegetation is controlled. The use of heavy timber equipment on this soil is limited during wet periods.

The seasonal high water table and the high shrink-swell potential and very slow permeability of the subsoil are the main limitations of the soil for community development. They limit use of the soil as a building site, as a site for sanitary landfills or septic tank absorption fields, and for many types of recreation. The soil has low strength as a subgrade material for local roads and streets.

The capability subclass is IIe.

23C—Peawick silt loam, 6 to 10 percent slopes. This soil is deep, sloping, and moderately well drained. It is on side slopes of drainageways on high stream terraces. Slopes are irregular, complex, and 80 to 200 feet long. The areas of this soil commonly are long and narrow. They range from 5 to 40 acres.

Typically, the surface layer of this soil is grayish brown silt loam about 3 inches thick. The subsoil extends to a depth of at least 76 inches. The upper 5 inches of the subsoil is olive yellow silty clay loam. The next 7 inches is yellowish brown silty clay. The next 35 inches of the subsoil is yellowish brown and brownish yellow, mottled clay. Gray silty clay is at a depth of more than 50 inches.

Included with this soil in mapping are small areas of well drained Wickham soils and somewhat poorly drained Newflat soils. The Wickham soils are on side slopes of drainageways, and the Newflat soils are on slightly lower, nearly level areas and near drainageways. Also included are areas with slopes of more than 10 percent. Included soils make up about 15 percent of this unit.

The permeability of this Peawick soil is very slow, and available water capacity is moderate. Surface runoff is rapid. The erosion hazard is severe. The subsoil has a high shrink-swell potential. The root zone commonly extends to a depth of 60 inches or more. The soil is low in organic matter content and natural fertility. It commonly ranges from extremely acid through strongly acid, but reaction of the surface layer varies because of local liming practices. A seasonal high water table is perched at a depth of 1-1/2 to 3 feet during winter and early spring.

Most areas of this soil are in woodland. A few areas are farmed.

This soil is moderately well suited to cultivated crops and well suited to pasture and hay. The thin surface layer and the high clay content of the subsoil hinder cultivation, especially when the soil is wet. After heavy rains, a crust forms on the surface, and the surface layer becomes compacted. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops and grasses and legumes in the cropping system; keeping crop residue on or in the soil; and contour tillage. All help to reduce runoff and control erosion, maintain organic matter content and tilth, reduce crusting, and increase water infiltration.

Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is wet often compact the surface layer, thereby increasing the erosion hazard.

The potential productivity for trees on this soil is moderately high, especially for loblolly pine. Seeds and seedlings survive and grow well if competing vegetation is controlled. The use of heavy timber equipment on this soil is limited during wet periods.

The perched seasonal high water table, the high shrink-swell potential and very slow permeability of the subsoil, and slope are the main limitations of the soil for community development. The water table, shrink-swell potential, slope, and permeability limit the use of the soil as a building site, as a site for sanitary landfills or septic tank absorption fields, and for most types of recreation. The soil has low strength as a subgrade material for local roads and streets.

The capability subclass is IIIe.

24—Rains loam. This soil is deep, nearly level, and poorly drained. It is on broad upland flats and in depressions. The areas of this soil are long and narrow or oval. They range from about 5 to 80 acres. Slopes range from 0 to 2 percent.

Typically, the surface layer of this soil is dark grayish brown loam about 8 inches thick. The subsurface layer is light gray loam 5 inches thick. The subsoil is 49 inches thick. It is mostly light brownish gray and gray loam with brown mottles. The substratum is gray stratified loamy fine sand, loam, and clay loam to a depth of at least 99 inches.

Included with this soil in mapping are small areas of moderately well drained Slagle soils, somewhat poorly drained Lynchburg soils, and poorly drained Kinston soils. The Slagle and Lynchburg soils are on the higher areas of the unit, and the Kinston soils are in drainageways. Also included are small depressions of poorly drained soils that have a subsoil of clay. These soils commonly have water on the surface for brief periods during winter and spring and after heavy or prolonged rainfall. Included soils make up about 15 percent of this unit.

The permeability of this Rains soil is moderate, and available water capacity is high. Surface runoff is very slow. The erosion hazard is slight. The subsoil has a low shrink-well potential. The root zone extends to a depth of 60 inches or more. The soil is low in organic matter content and natural fertility. It commonly is very strongly acid or strongly acid, but reaction of the surface layer varies because of local liming practices. A seasonal high water table is between the surface and a depth of 1 foot during winter and spring.

Most areas of this soil are in woodland, but some drained areas are farmed.

The drained areas of this soil are well suited to farming, and the undrained areas are moderately well suited. The soil is wet and cold in spring, and wetness often interferes with tillage and crop harvesting. Although drainage outlets generally are not available, surface or subsurface drainage helps to alleviate wetness and protects crops from damage. Without drainage, use of the soil for cultivated crops is not practical in most years. After heavy rains, a crust forms on the surface, and the surface layer becomes compacted. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops and grasses and legumes in the cropping system; and keeping crop residue on or in the soil. All help to maintain organic matter content and tilth, reduce crusting, and increase water infiltration.

Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, drainage, and using lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is wet cause compaction of the surface layer and damage the stands of grasses and legumes.

The potential productivity for trees on this soil is high, especially for loblolly pine, sweetgum, and willow oak. Seeds and seedlings survive and grow well if competing vegetation is controlled. The soil is soft when wet, thus limiting the use of heavy timber equipment.

The seasonal high water table is the main limitation of the soil for community development, especially as a site for sanitary landfills, building sites, septic tank absorption fields, and most types of recreation.

The capability subclass is IVw undrained and IIIw drained.

25A—Slagle sandy loam, 0 to 2 percent slopes. This soil is deep, nearly level, and moderately well drained. It is on broad flats on uplands and around the heads of drainageways. The areas of this soil commonly are long and narrow or irregularly oval. They range from about 5 to 30 acres.

Typically, the surface layer of this soil is grayish brown sandy loam about 10 inches thick. The subsoil is 38 inches thick. The upper part is yellowish brown sandy loam and sandy clay loam. The lower part is light yellowish brown and light gray, mottled sandy clay loam. The substratum is mottled, light gray sandy loam to a depth of at least 65 inches.

Included with this soil in mapping are small areas of well drained Emporia and Norfolk soils, moderately well drained Montross and Burrowsville soils, and somewhat poorly drained Lynchburg soils. The Emporia and Norfolk soils are on the higher areas of the unit. The Montross and Burrowsville soils are on broad flats and near the heads of drainageways. The Lynchburg soils are in slight depressions and near drainageways. Also included are small areas that have water on the surface for brief periods after heavy or prolonged rainfall during winter and spring. Included soils make up about 15 percent of this unit.

The permeability of this Slagle soil is moderate in the upper part of the subsoil and moderately slow in the lower part. Available water capacity is moderate. Surface runoff is slow. The erosion hazard is slight. The subsoil has a moderate shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is low in organic matter content and natural fertility. It commonly is very strongly acid or strongly acid, but reaction of the surface layer varies because of local liming practices. A seasonal high water table is perched at a depth of 1-1/2 to 3 feet during winter and spring.

About half of the acreage of this soil is used for cultivated crops. A few areas are in pasture, and the remaining acreage is in woodland.

This soil is well suited to cultivated crops (fig. 8) and to pasture and hay. Crops respond well to lime and fertilizer. After heavy rains, however, a crust forms on the surface, and the surface layer becomes compacted. The soil is wet and cold in spring, and wetness often delays tillage. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops and grasses and legumes in the cropping system; and keeping crop residue on or in the soil. All help to maintain organic matter content and tilth, reduce crusting, and increase water infiltration.

Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is too wet cause compaction of the surface layer and damage the stands of grasses and legumes.

The potential productivity for trees on this soil is high, especially for loblolly pine, oaks, yellow-poplar, and sweetgum. Seeds and seedlings survive and grow well if competing vegetation is controlled. The soil is soft when wet, thus limiting the use of heavy timber equipment.

The seasonal high water table, low strength, and the moderately slow permeability of the subsoil are the main limitations of the soil for community development. The water table and the permeability limit the use of the soil as a building site, as a site for sanitary landfills or septic tank absorption fields, and for most types of recreation. The low strength limits the use of the soil as a subgrade material for roads and streets.

The capability subclass is IIw.

25B—Slagle sandy loam, 2 to 6 percent slopes. This soil is deep, gently sloping, and moderately well drained. It is on side slopes of uplands and is near the heads of drainageways. Slopes are smooth and slightly convex and are 80 to 300 feet long. The areas of this soil commonly are long and narrow or oval. They range from about 5 to 40 acres.

Typically, the surface layer of this soil is grayish brown sandy loam about 10 inches thick. The subsoil is 38 inches thick. The upper part is yellowish brown sandy loam and sandy clay loam. The lower part is light yellowish brown and light gray, mottled sandy clay loam. The substratum is mottled, light gray sandy loam to a depth of at least 65 inches.

Included with this soil in mapping are small areas of well drained Bonneau and Emporia soils; moderately well drained Ackwater, Burrowsville, and Montross soils; and poorly drained Kinston soils. The Bonneau and Emporia soils are on the higher areas of the unit. The Ackwater, Burrowsville, and Montross soils are on side slopes and near the heads of drainageways. The Kinston soils are along drainageways. Included soils make up about 20 percent of this unit.

The permeability of this Slagle soil is moderate in the upper part of the subsoil and moderately slow in the lower part. Available water capacity is moderate. Surface runoff is medium. The erosion hazard is moderate. The subsoil has a moderate shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is low in organic matter content and natural fertility. It mainly is very strongly acid or strongly acid, but reaction of the surface layer varies because of local liming practices. A seasonal high water table is perched at a depth of 1-1/2 to 3 feet during winter and spring.

About half of the acreage of this soil is in woodland. Most of the rest is farmed.

This soil is well suited to cultivated crops and to pasture and hay. Crops respond well to lime and fertilizer. After heavy rains, however, a crust forms on the surface, and the surface layer becomes compacted. The soil is wet and cold in spring, and wetness often delays tillage. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops and grasses and legumes in the cropping system; and keeping crop residue on or in

Figure 8.—Soybeans on an area of Slagle sandy loam, 0 to 2 percent slopes.

the soil. All help to maintain organic matter content and tilth, reduce crusting, and increase water infiltration.

Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is too wet cause compaction of the surface layer and damage the stands of grasses and legumes, which increases the erosion hazard.

The potential productivity for trees on this soil is high, especially for loblolly pine, oaks, yellow-poplar, and sweetgum. Seeds and seedlings survive and grow well if competing vegetation is controlled. The soil is soft when wet, thus limiting the use of heavy timber equipment.

The seasonal high water table, low strength, and the moderately slow permeability of the subsoil are the main limitations of the soil for community development. The water table and permeability limit the use of the soil as a building site, as a site for sanitary landfills or septic tank absorption fields, and for most recreational uses. The low strength limits the use of the soil as a subgrade material for roads and streets.

The capability subclass is IIe.

25C—Slagle sandy loam, 6 to 10 percent slopes. This soil is deep, sloping, and moderately well drained. It is on side slopes of drainageways. Slopes are smooth, slightly concave, and 50 to 200 feet long. The areas of this soil are irregularly long and winding. They range from about 5 to 20 acres.

Typically, the surface layer of this soil is grayish brown sandy loam about 10 inches thick. The subsoil is 38 inches thick. The upper part is yellowish brown sandy loam and sandy clay loam. The lower part is light yellowish brown and light gray, mottled sandy clay loam. The substratum is mottled, light gray sandy loam to a depth of at least 65 inches.

Included with this soil in mapping are small areas of well drained Emporia and Bonneau soils and moderately well drained Ackwater soils. The Emporia and Bonneau soils are on narrow ridges and side slopes. The

Ackwater soils are on side slopes of drainageways. Included soils make up about 20 percent of this unit.

The permeability of this Slagle soil is moderate in the upper part of the subsoil and moderately slow in the lower part. Available water capacity is moderate. Surface runoff is rapid. The erosion hazard is severe. The subsoil has a moderate shrink-swell potential. The root zone extends to a depth of about 60 inches or more. The soil is low in organic matter content and natural fertility. It commonly is very strongly acid or strongly acid, but reaction of the surface layer varies because of local liming practices. A seasonal high water table is perched at a depth of 1-1/2 to 3 feet during winter and spring.

Most areas of this soil are in woodland. A small acreage is cultivated, and some areas are in pasture.

Slope makes this soil only moderately well suited to cultivated crops. The soil is well suited to pasture and hay. Crops respond well to lime and fertilizer. After heavy rains, however, a crust forms on the surface, and the surface layer becomes compacted. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; contour tillage; using cover crops and grasses and legumes in the cropping system; and keeping crop residue on or in the soil. All help to maintain organic matter content and tilth, control a severe erosion hazard, reduce crusting, and increase water infiltration. Grassed waterways and diversions further help to control the rapid surface runoff and reduce erosion.

Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing causes compaction of the surface layer and damages the stands of grasses and legumes, increasing the erosion hazard.

The potential productivity for trees on this soil is moderately high, especially for loblolly pine, sweetgum, and southern red oak. Seeds and seedlings survive and grow well if competing vegetation is controlled. The soil is soft when wet, thus limiting the use of heavy timber equipment.

The seasonal high water table, slope, low strength, and the moderately slow permeability of the subsoil are the main limitations of the soil for community development. Slope, the water table, and the permeability limit the use of the soil as a building site, as a site for sanitary facilities, and for most types of recreation. The subsoil has low strength when wet, limiting vehicular traffic in unpaved areas.

The capability subclass is IIIe.

26—Udorthents, loamy. This unit consists of deep, well drained or moderately well drained soils in areas that have been disturbed during excavation and grading. The areas in the northwestern part of the survey area near the Appomattox River and a small area near lower Powells Creek consist of sand and gravel quarries. Some areas along US-301 and I-95 were used mostly as source material for highway construction. The areas of this unit range from about 3 to 200 acres. Slopes are mostly 0 to 25 percent but range from 0 to 50 percent.

Included with this unit in mapping are small areas of well drained Emporia, Wickham, Pamunkey, and Bonneau soils; moderately well drained Slagle and Bolling soils; and poorly drained Argent soils. Also included are stockpiles of washed sand and gravel, small bodies of water, areas of somewhat poorly and poorly drained soils, and sanitary landfills. Included areas make up about 25 percent of this unit.

The properties and characteristics of the areas of this unit are so variable that an onsite investigation is generally needed to determine the suitability and potential of the unit for most uses.

The capability subclass: unassigned.

27—Udorthents, clayey. This unit consists of deep, well drained or moderately well drained soils that have been disturbed by excavation. Some areas consist of fill materials for building sites, roads, recreational facilities, and other uses. A few areas have been used for trash disposal. The areas of the unit range from about 3 to 40 acres. Slopes commonly are 0 to 10 percent but range up to 25 percent.

Included with this unit in mapping are small urbanized areas; small areas of well drained Aycock, Emporia, and Wickham soils; small areas of moderately well drained Ackwater, Slagle, and Peawick soils; and small areas of somewhat poorly drained Newflat and Lynchburg soils. Included areas make up about 20 percent of this unit.

The properties and characteristics of the areas of this unit are so variable that an onsite investigation is generally needed to determine the suitability and potential of the unit for most uses.

The capability subclass: unassigned.

28—Urban land. This unit consists of areas where more than 80 percent of the surface is covered by asphalt, concrete, buildings, or other impervious surfaces. These areas consist mostly of parking lots, shopping and business centers, and industrial parks in and near Hopewell and in Fort Lee. The areas range from about 3 to 40 acres. Slopes commonly are 0 to 6 percent but range up to 10 percent.

Included with this unit in mapping are small areas of Udorthents; well drained Aycock, Emporia, and Wickham soils; moderately well drained Ackwater, Slagle, and Peawick soils; and somewhat poorly drained Lynchburg and Newflat soils. Included areas make up about 20 percent of this unit.

Onsite investigation is needed to determine the suitability and limitations of this unit for any use.

The capability subclass: unassigned.

29—Urban land-Udorthents complex. This unit consists of areas that are mostly asphalt, concrete, and buildings and areas that have been excavated or filled. The areas of the unit range from about 3 to 40 acres. Slopes commonly are 0 to 6 percent but range up to 15 percent. The Urban land and Udorthents are so intermingled that it was not practical to map them seperately. The unit is about 70 percent Urban land and 20 percent Udorthents. The remaining 10 percent is mostly small areas of well drained Aycock, Emporia, and Wickham soils; moderately well drained Ackwater, Peawick, and Slagle soils; and somewhat poorly drained Lynchburg and Newflat soils.

An onsite investigation is needed to determine the suitability and limitations of this unit for any use.

The capability subclass: unassigned.

30A—Wickham fine sandy loam, 0 to 2 percent slopes. This soil is deep, nearly level, and well drained. It is on ridges on high stream terraces. The areas commonly are long and narrow or oval. They range from about 10 to 20 acres.

Typically, the surface layer of this soil is yellowish brown fine sandy loam about 9 inches thick. The subsoil is 53 inches thick. It mostly is strong brown loam and yellowish red sandy clay loam, clay loam, and sandy loam. The substratum is mottled, yellowish brown sandy loam that extends to a depth of at least 88 inches.

Included with this soil in mapping are small areas of moderately well drained Peawick soils that are in slight depressions and on ridges. Also included are areas on knobs and sharp ridges, mainly along the Appomattox and James Rivers, of well drained soils that have more clay in the subsoil than does this Wickahm soil has. Some soils have more brown in the subsoil than this Wickham soil. Included soils make up about 15 percent of this unit.

The permeability of this Wickham soil is moderate, and available water capacity is moderate. Surface runoff is slow. The erosion hazard is slight. The subsoil has a low shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is low in organic matter content and natural fertility. It commonly is very strongly acid through medium acid, but reaction of the surface layer varies because of local liming practices.

Most areas of this soil are in woodland. Some of the included areas near the Appomattox River are mostly farmed.

This soil is well suited to cultivated crops and to pasture and hay. Crops respond well to lime and fertilizer. After heavy rains, however, a crust forms on the surface, and the surface layer becomes compacted. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops and grasses and legumes in the cropping system; and keeping crop residue on or in the soil. All help to maintain organic matter content and tilth, reduce crusting, and increase water infiltration.

Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing causes compaction of the surface layer and damages the stands of grasses and legumes.

The potential productivity for trees on this soil is high, especially for loblolly pine, yellow-poplar, and oaks. Seeds and seedlings survive and grow well.

The permeability of the subsoil is the main limitation of the soil for community development. The permeability limits the use of the soil as a site for sewage lagoons and sanitary landfills because of a seepage hazard. The included areas with more clay in the subsoil are limited for septic tank absorption fields because of a slower rate of permeability.

The capability class is I.

30B—Wickham fine sandy loam, 2 to 6 percent slopes. This soil is deep, gently sloping, and well drained. It is on ridges and side slopes on high stream terraces. The areas commonly are long and narrow or oval. They range from about 10 to 30 acres. Slopes are 200 to 400 feet long.

Typically, the surface layer of this soil is yellowish brown fine sandy loam about 9 inches thick. The subsoil is 53 inches thick. It mostly is strong brown loam and yellowish red sandy clay loam, clay loam, and sandy loam. The substratum is mottled, yellowish brown sandy loam that extends to a depth of at least 88 inches.

Included with this soil in mapping are small areas of moderately well drained Peawick soils that are in slight depressions and on ridges. Also included are areas on knobs and sharp ridges, mainly along the Appomattox and James Rivers, of well drained soils that have more clay in the subsoil than does this Wickham. Some soils have more brown in the subsoil than this Wickham soil. Included soils make up about 20 percent of this unit.

The permeability of this Wickham soil is moderate, and available water capacity is moderate. Surface runoff is medium. The erosion hazard is moderate. The subsoil has a low shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is low in organic matter content and natural fertility. It commonly is very strongly acid through medium acid, but reaction of the surface layer varies because of local liming practices.

Most areas of this soil are in woodland. Some of the included areas near the Appomattox River are mostly farmed.

This soil is well suited to cultivated crops and to pasture and hay. Crops respond well to lime and fertilizer. After heavy rains, however, a crust forms on the surface, and the surface layer becomes compacted. The main management practices in cultivated areas are:

using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops and grasses and legumes in the cropping system; and keeping crop residue on or in the soil. All help to maintain organic matter content and tilth, control the moderate erosion hazard, reduce crusting, and increase water infiltration.

Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing causes compaction of the surface layer, which increases runoff and the erosion hazard.

The potential productivity for trees on this soil is high, especially for loblolly pine, yellow-poplar, and oaks. Seeds and seedlings survive and grow well.

The permeability of the subsoil is the main limitation of the soil for community development. The permeability limits the use of the soil as a site for sewage lagoons and sanitary landfills because of a seepage hazard. The included areas with more clay in the subsoil are limited for septic tank absorption fields because of a slower rate of permeability.

The capability class is IIe.

30C—Wickham fine sandy loam, 6 to 10 percent slopes. This soil is deep, sloping, and well drained. It is on convex side slopes on high stream terraces. The areas are long and narrow. They range from about 10 to 20 acres. Slopes commonly are 80 to 300 feet long.

Typically, the surface layer of this soil is yellowish brown fine sandy loam about 9 inches thick. The subsoil is 53 inches thick. It mostly is strong brown loam and yellowish red sandy clay loam, clay loam, and sandy loam. The substratum is mottled, yellowish brown sandy loam that extends to a depth of at least 88 inches.

Included with this soil in mapping are small areas of well drained Emporia soils and moderately well drained Peawick and Slagle soils. The Emporia and Slagle soils are on the crests of slopes and on knobs. The Peawick soils are in shallow swales and on narrow ridges. Also included are areas on knobs and sharp ridges, mainly along the Appomattox River, of well drained soils that have more clay in the subsoil than this Wickham soil has. Included soils make up about 20 percent of this unit.

The permeability of this Wickham soil is moderate, and available water capacity is moderate. Surface runoff is rapid. The erosion hazard is severe. The subsoil has a low shrink-swell potential. The root zone extends to a depth of 60 inches or more. The soil is low in organic matter content and natural fertility. It commonly is very strongly acid through medium acid, but reaction of the surface layer varies because of local liming practices.

Most areas of this soil are in woodland. The included soils near the Appomattox River are mostly in pasture.

This soil is poorly suited to cultivated crops and well suited to pasture and hay crops. Slope and the severe erosion hazard are the major limitations for cultivation. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing causes compaction of the surface layer, which increases runoff and the erosion hazard.

The potential productivity for trees on this soil is high, especially for loblolly pine, yellow-poplar and oaks. Seeds and seedlings survive and grow well.

The permeability of the subsoil and slope are the main limitations of the soil for community development. Slope limits the use of the soil as a building site, as a site for sanitary facilities, and for some types of recreation. The permeability and slope limit the use of the soil for sanitary landfills because of a seepage hazard. The included areas of soils with more clay in the subsoil are further limited as sites for buildings and sanitary facilities because of a slower rate of permeability in the subsoil.

The capability subclass is IIIe.

prime farmland

Prime farmland is one of several kinds of important farmlands defined by the U. S. Department of Agriculture. It is of major importance in providing the Nation's short- and long-range needs for food and fiber. The supply of high quality farmland is limited, and the U. S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, must encourage and facilitate the use of our Nation's prime farmland with wisdom and foresight.

Prime farmland, as defined by the U. S. Department of Agriculture, is the land that is best suited to producing food, feed, forage, fiber, and oilseed crops. It has the soil quality, growing season, and moisture supply needed to economically produce a sustained high yield of crops when it is treated and managed using acceptable farming methods. Prime farmland produces the highest yields with minimal inputs of energy and economic resources, and farming it results in the least damage to the environment.

Prime farmland may now be in crops, pasture, woodland, or other land, but not urban or built-up land or water areas. It must either be used for producing food or fiber or be available for those uses.

Prime farmland usually has an adequate and dependable supply of moisture from precipitation or irrigation. It also has favorable temperature and growing season and acceptable levels of acidity or alkalinity. It has few or no rocks and is permeable to water and air. Prime farmland is not excessively erodible or saturated with water for long periods and is not flooded during the growing season. The slope range is mainly from 0 to 6 percent. About 66,100 acres in the county, or nearly 37 percent of the land area, meets the soil requirements for prime farmland. For more detailed information on the criteria for prime farmland, consult the local staff of the Soil Conservation Service.

A recent trend in land use in some parts of the survey area has been toward the loss of some prime farmlands to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and difficult to cultivate and are usually less productive.

Soil map units that make up prime farmland in Prince George County are listed in this section. This list does not constitute a recommendation for a particular land use. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps in the back of this publication. The soil qualities that affect use and management are described in the section "Detailed soil map units."

Soils that have a limitation, such as a high water table, may qualify for prime farmland if the limitation is overcome. In the following list, the measure needed to overcome the limitation is shown in parentheses after the map unit name. Onsite evaluation is necessary to determine that the limitation has been overcome by corrective measures.

The map units that meet the soil requirements for prime farmland are:

4A	Aycock silt loam, 0 to 2 percent slopes
4B	Aycock silt loam, 2 to 6 percent slopes
6	Bolling silt loam
11B	Emporia fine sandy loam, 2 to 6 percent slopes
16	Lynchburg loam (if artificially drained and drainage is maintained)
21	Norfolk fine sandy loam
22A	Pamunkey loam, 0 to 2 percent slopes
22B	Pamunkey loam, 2 to 6 percent slopes
24	Rains loam (if artificially drained and drainage is maintained)
25A	Slagle sandy loam, 0 to 2 percent slopes
25B	Slagle sandy loam, 2 to 6 percent slopes
30A	Wickham fine sandy loam, 0 to 2 percent slopes
30B	Wickham fine sandy loam, 2 to 6 percent slopes

use and management of the soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavior characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where wetness, very firm soil layers, or unstable cutbanks can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

crops and pasture

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed soil map units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

The number of farms in Prince George County has decreased since 1970, but on the average, the size of each farm has increased, and the total acreage in farms has increased.

Peanuts, corn, and soybeans are the major farm products, but some wheat, barley, cattle, hogs, and tobacco are produced. Many of the soils are suited to vegetables, small fruits, tree fruits, melons, and ornamental plants; however, only a very small acreage is used to produce vegetables and fruits.

Controlling erosion is a major concern on cropland and pasture in Prince George County. If the slope is greater than 2 percent, erosion often is a hazard. Erosion of the surface layer results in reduced productivity and an increase in sedimentation of streams and ponds.

Using grassed waterways, terraces or diversions, and minimum tillage, planting permanent grass or vegetation, and using grass or low-growing crops in the crop rotation are practices that help to control erosion on cropland and pasture. The kinds of practices suitable for any area depend primarily on farm needs and the kinds of soils in the area. The soils in capability subclasses IIe, IIIe, IVe, VIe, and VIIe are subject to water erosion.

Drainage of excessively wet soils is a major management concern in Prince George County. The quantity and quality of crops and pasture plants generally improve as a result of adequate soil drainage. Most areas can be drained using subsurface drainage. In some areas, however, subsurface drainage is not practical for a a variety of reasons, for example, the difficulty of establishing suitable outlets or the presence of a restrictive layer in the soil. The soils in capability subclasses IIw, IIIw, and IVw can usually be artificially drained if a suitable outlet can be established.

Most of the soils of Prince George County are strongly acid to extremely acid and are low in natural fertility. Thus, fertilization and liming are needed for sustaining crop and pasture yields.

yields per acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green-manure crops; and harvesting that insures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

land capability classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor does it consider possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland and for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. Only class and subclass are used in this survey. These levels are defined in the following paragraphs.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, woodland, wildlife habitat, or recreation.

Capability units are soil groups within a subclass. The soils in a capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe-4 or IIIe-6.

The capability classification of each map unit is given in the section "Detailed soil map units."

woodland management and productivity

Table 6 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination (woodland suitability) symbol for each soil. Soils assigned the same ordination symbol

require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for important trees. The number 1 indicates very high productivity; 2, high; 3, moderately high; 4, moderate; and 5, low. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *x* indicates stoniness or rockiness; *w*, excessive water in or on the soil; *t*, toxic substances in the soil; *d*, restricted root depth; *c*, clay in the upper part of the soil; *s*, sandy texture; *f*, high content of coarse fragments in the soil profile; and *r*, steep slopes. The letter *o* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: x, w, t, d, c, s, f, and r.

In table 6, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Ratings of the *erosion hazard* indicate the risk of loss of soil in well managed woodland. The risk is *slight* if the expected soil loss is small, *moderate* if measures are needed to control erosion during logging and road construction, and *severe* if intensive management or special equipment and methods are needed to prevent excessive loss of soil.

Ratings of *equipment limitation* reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or in equipment; and *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings indicate the degree to which the soil affects the mortality of tree seedlings. Plant competition is not considered in the ratings. The ratings apply to seedlings from good stock that are properly planted during a period of sufficient rainfall. A rating of *slight* indicates that the expected mortality is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

Ratings of *windthrow hazard* are based on soil characteristics that affect the development of tree roots and the ability of the soil to hold trees firmly. A rating of *slight* indicates that few trees may be blown down by strong winds; *moderate*, that some trees will be blown down during periods of excessive soil wetness and strong winds; and *severe*, that many trees are blown down during periods of excessive soil wetness and moderate or strong winds.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

Trees to plant are those that are suited to the soils and to commercial wood production.

recreation

The soils of the survey area are rated in table 7 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 7, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 7 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 10 and interpretations for dwellings without basements and for local roads and streets in table 9.

Camp areas require site preparation such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet,

are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking, horseback riding, and bicycling should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

wildlife habitat

Lawrence H. Robinson, biologist for the Soil Conservation Service, assisted in preparing this section.

Some of the common types of wildlife in the wooded parts of the survey area are white-tailed deer, wild turkey, gray squirrel, red and gray foxes, opossum, and raccoon. Quail and rabbit inhabit areas along the edges of fields and wood lines. Owls, pileated woodpeckers, hawks, and turkey vultures are among the other large birds that inhabit the larger wooded areas.

During winter months, numerous species of waterfowl migrate to the marshes along the James River and the wooded swamps of the Blackwater River.

Fish common to the James, Blackwater, and Appomattox Rivers include catfish, rock fish, largemouth bass, white shad, herring, and sunfish. Largemouth bass and bluegill are common in small ponds.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 8, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, soybeans, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, panicgrass, goldenrod, beggarweed, foxtail millet, and dandelion.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, the available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, blackgum, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are

suitable for planting on soils rated *good* are autumn-olive, amur honeysuckle, and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pines and redcedar.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, and slope. Examples of wetland plants are smartweed, wild millet, wildrice, cordgrass, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are wetness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include bobwhite quail, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, deer, and opossum.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, and beaver.

engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations need to be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to (1) evaluate the potential of areas for residential, commercial, industrial, and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5) plan detailed onsite investigations of soils and geology; (6) locate potential sources of gravel, sand, earthfill, and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

building site development

Table 9 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use

and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

sanitary facilities

Table 10 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 10 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of

compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 10 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, and content of organic matter.

Excessive seepage due to rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 10 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, highly organic layers, soil reaction, and content of salts affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

construction materials

Table 11 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a probable or improbable source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They may have layers

of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 11, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

water management

Table 12 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to

bedrock and the content of large stones affect the ease of excavation.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to a cemented pan, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts or sulfur. Availability of drainage outlets is not considered in the ratings.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

soil properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

engineering index properties

Table 13 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil series and their morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (*2*) and the system adopted by the American Association of State Highway and Transportation Officials (*1*).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The

estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

physical and chemical properties

Table 14 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, and plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earth-moving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3 bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Organic matter is the plant and animal residue in the soil at various stages of decomposition.

In table 14, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

soil and water features

Table 15 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Some soils in table 16 are assigned to two hydrologic soil groups. Dual grouping is used for one of two reasons: (1) Some soils have a seasonal high water table but can be drained. In this instance the first letter applies to the drained condition of the soil and the second letter to the undrained condition. (2) In some soils that are less than 20 inches deep to bedrock, the first letter applies to areas where the bedrock is impervious and the second letter to areas where the bedrock is impervious or where bedrock makes up more than 25 percent of the surface area of the soil.

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, nor is water in swamps and marshes.

Table 14 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, common, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *common* that it is likely under normal conditions; *occasional* that it occurs, on the average, no more than once in 2 years; and *frequent* that it occurs, on the average, more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; November-May, for example, means that flooding can occur during the period November through May.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons that form in soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 15 are the depth to the seasonal high water table; the kind of water table—that is, perched, artesian, or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 15.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. An *artesian* water table is under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Only saturated zones within a depth of about 6 feet are indicated. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high

the water rises above the surface. The second numeral indicates the depth below the surface.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

classification of the soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*3*). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 16 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Ultisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquults (*Aqu*, meaning water, plus *ult*, from Ultisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Paleaquults (*Pale*, meaning old excessive development, plus *aquults*, the suborder of the Ultisols that have an aquic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Paleaquults.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, siliceous, thermic Typic Paleaquults.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

soil series and their morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the Soil Survey Manual (*4*). Many of the technical terms used in the descriptions are defined in Soil Taxonomy (*3*). Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed soil map units."

Ackwater series

The soils of the Ackwater series are deep and moderately well drained. They formed in clayey fluvial and marine sediments. Ackwater soils are on broad upland flats and side slopes. Slopes range from 0 to 25 percent.

Ackwater soils commonly are near Aycock and Montross soils. Ackwater soils are not as well drained as and have more clay than Aycock soils, and they have more clay than Montross soils.

Typical pedon of Ackwater silt loam, 2 to 6 percent slopes, about 2,400 feet east of the junction of VA-106 and VA-634, 150 feet north of Gregory Chapel:

A1—0 to 5 inches; light yellowish brown (2.5Y 6/4) silt loam; moderate medium granular structure; friable, slightly sticky, slightly plastic; common fine roots; extremely acid; clear smooth boundary.

B21t—5 to 9 inches; yellowish brown (10YR 5/6) silty clay loam; weak medium subangular blocky structure; friable, sticky, slightly plastic; few medium roots; few very fine pores; few thin discontinuous clay films on faces of peds; extremely acid; clear smooth boundary.

B22t—9 to 16 inches; yellowish brown (10YR 5/8) silty clay loam; moderate medium subangular blocky structure; firm, sticky, plastic; few fine roots; few very fine pores; common thick continuous clay films on faces of peds; very strongly acid; gradual smooth boundary.

B23t—16 to 28 inches; strong brown (7.5YR 5/8) silty clay; many coarse distinct light gray (10YR 7/1) mottles and common medium prominent red (2.5YR 4/8) mottles; weak coarse prismatic structure parting to moderate medium subangular blocky; firm, sticky, plastic; few fine roots; few very fine pores; common thick continuous clay films on faces of peds; very strongly acid; gradual wavy boundary.

B24t—28 to 52 inches; mottled strong brown (7.5YR 5/8), light gray (10YR 7/1), red (2.5YR 4/8), and brownish yellow (10YR 6/8) silty clay; moderate coarse prismatic structure parting to moderate very thick platy parting to moderate medium angular blocky; firm, sticky, plastic; few very fine roots along faces of peds; common thick continuous clay films on faces of peds; very strongly acid; gradual smooth boundary.

B25tg—52 to 72 inches; light gray (N 7/0) silty clay; many coarse distinct strong brown (7.5YR 5/8) and red (2.5YR 4/8) mottles; weak coarse prismatic structure parting to weak thick platy parting to moderate fine subangular blocky; very firm, sticky, plastic; common thick continuous clay films on faces of peds; very strongly acid.

The solum thickness is more than 60 inches. The soil ranges from extremely acid through strongly acid unless limed. Coarse fragments make up 0 to 2 percent of the soil.

The A horizon has hue of 10YR or 2.5Y, value of 4 through 6, and chroma of 1 through 4. It mainly is loam or silt loam. In eroded areas it is clay loam or silty clay loam.

Some pedons have a B1 horizon that has hue of 10YR or 2.5Y, value of 4 through 6, and chroma of 4 through 8. It is loam, silt loam, clay loam, or silty clay loam.

The upper part of the B2t horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 through 8. The lower part of the B2t horizon is mottled. It is neutral and has value of 5 through 7; or it has hue of 10YR or 2.5Y, value of 5 through 7, and chroma of 1 through 8; or it is multicolored. The B2t horizon is clay loam, silty clay loam, silty clay, or clay. Some pedons have a B3 horizon that has the same color and texture as the lower part of the B2t horizon.

Argent series

The soils of the Argent series are deep and poorly drained. They formed in clayey fluvial sediments. Argent soils are in drainageways and depressions of low river terraces. Slopes range from 0 to 2 percent.

Argent soils commonly are near Bolling, Levy, Muckalee, and Pamunkey soils. The Argent soils have more clay in the subsoil than and are not as well drained as the Bolling or Pamunkey soils; are not continuously saturated, as are the Levy soils; and have more clay in the subsoil than the Muckalee soils.

Typical pedon of Argent silt loam, 1-1/2 miles northwest of the intersection of VA-653 and VA-602, Upper Brandon Plantation, 100 feet south of lane adjacent to open drainage ditch:

Ap—0 to 6 inches; grayish brown (10YR 5/2) silt loam; many fine distinct yellowish brown (10YR 5/6) mottles; moderate fine granular structure; friable, sticky, slightly plastic; many fine roots; few fine flakes of mica; medium acid; abrupt smooth boundary.

B1tg—6 to 11 inches; grayish brown (2.5Y 5/2) clay loam; few medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm, sticky, slightly plastic; common fine roots; few small pores; few thin patchy clay films on faces of peds; few manganese stains; few small pebbles; very strongly acid; clear smooth boundary.

B21tg—11 to 26 inches; light gray (N 6/0) silty clay; strong coarse prismatic structure parting to strong medium angular blocky; firm, very sticky, very plastic; few fine roots; few small pores; common thin patchy clay films on faces of peds; few manganese stains; few small pebbles; few fine flakes of mica; very strongly acid; gradual smooth boundary.

B22tg—26 to 61 inches; gray (N 5/0) silty clay; few medium distinct strong brown (7.5YR 5/6) mottles; strong coarse prismatic structure parting to strong medium angular blocky; very firm, very sticky, very plastic; few fine roots; common thin continuous clay films on faces of peds; few small pebbles; few fine flakes of mica; very strongly acid; gradual smooth boundary.

B3tg—61 to 82 inches; light gray (10YR 6/1) clay loam; many coarse distinct yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; firm, very sticky, plastic; few patchy clay films on faces of peds; few fine flakes of mica; few small pebbles; medium acid; gradual wavy boundary.
Cg—82 to 97 inches; light gray (10YR 6/1) sandy clay loam; many coarse distinct yellowish brown (10YR 5/6) mottles; massive; slightly sticky, slightly plastic; slightly acid.

The solum thickness is more than 50 inches. In unlimed areas the soil ranges from very strongly acid through medium acid to a depth of about 50 to 60 inches. It is medium acid or slightly acid below that depth.

The A horizon is neutral and has value of 2 through 5; or has hue of 10YR, value of 2 through 5, and chroma of 1 or 2. It is loam, silt loam, or silty clay loam.

The B1 horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 1 or 2. It is silty clay loam or clay loam.

The B2tg horizon is neutral and has value of 5 or 6; or has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 or 2. It is clay or silty clay.

The B3g horizon is neutral and has value of 5 through 7; or has hue of 10YR through 5Y, value of 5 through 7, and chroma of 1 through 3. It is clay loam or silty clay loam.

The C horizon is neutral and has value of 5 through 7; or has hue of 10YR through 5Y, value of 5 through 7, and chroma of 1 or 2. It ranges from clay to sandy clay loam.

Aycock series

The soils of the Aycock series are deep and well drained. They formed in loamy fluvial and marine sediments. Aycock soils are on broad uplands and side slopes. Slopes range from 0 to 6 percent.

Aycock soils commonly are near Ackwater and Montross soils. The Aycock soils are better drained and have less clay than the Ackwater soils and are better drained than and do not have a firm compact subsoil characteristic of the Montross soils.

Typical pedon of Aycock silt loam, 0 to 2 percent slopes, 3/4 mile northeast of the intersection of VA-106 and VA-634 and 200 feet east of a cultivated field:

O2—2 inches to 0; loose leaves and twigs and dark reddish brown (5YR 3/2) partially decomposed leaf litter.
A1—0 to 2 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; friable; many fine roots; very strongly acid; abrupt smooth boundary.
A2—2 to 7 inches; light olive brown (2.5Y 5/4) silt loam; weak fine subangular blocky structure; friable, slightly sticky; common fine and medium roots; very strongly acid; clear smooth boundary.
B21t—7 to 10 inches; light olive brown (2.5Y 5/6) silt loam; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; common fine roots and few medium roots; few fine pores; few thin patchy clay films on faces of peds; very strongly acid; gradual smooth boundary.
B22t—10 to 15 inches; olive yellow (2.5Y 6/6) silt loam; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; common fine roots and few medium roots; common fine pores; few thin patchy clay films on faces of peds; very strongly acid; gradual smooth boundary.
B23t—15 to 25 inches; yellowish brown (10YR 5/8) silt loam; moderate fine subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; common fine pores; common thin patchy clay films on faces of peds; very strongly acid; clear smooth boundary.
B24t—25 to 32 inches; yellowish brown (10YR 5/8) silty clay loam; many coarse distinct strong brown (7.5YR 5/6) mottles and few fine distinct light yellowish brown (10YR 6/4) mottles; weak very thick platy structure parting to moderate fine and medium subangular blocky; firm, sticky, plastic; few fine roots; common fine pores; common thin patchy yellowish red (5YR 5/6) clay films on faces of peds; very strongly acid; clear smooth boundary.
B25t—32 to 64 inches; yellowish brown (10YR 5/8) silty clay loam; common medium distinct light gray (10YR 7/1) mottles; weak very thick platy structure parting to weak fine subangular blocky; firm, sticky, plastic; few fine roots; few fine pores; common thin patchy clay films on faces of peds; very strongly acid.

The solum thickness is more than 60 inches. The soil is very strongly acid or strongly acid unless limed.

The A horizon has hue of 10YR or 2.5Y, value of 4 through 6, and chroma of 2 through 4. It is silt loam or loam.

The B2t horizon has hue of 7.5YR through 2.5Y, value of 5 through 7, and chroma of 4 through 8. It is silt loam, clay loam, or silty clay loam.

Bojac series

The soils of the Bojac series are deep and well drained. They formed in loamy fluvial sediments. Bojac soils are on low-lying river terraces. Slopes range from 0 to 4 percent.

Bojac soils commonly are near Bolling, Muckalee, and Pamunkey soils. The Bojac soils are better drained and have less clay in the subsoil than the Bolling soils. The Bojac soils are better drained than the Muckalee soils and are not flooded, and they have less clay in the subsoil than the Pamunkey soils.

Typical pedon of Bojac loamy sand, 1 mile east of the end of VA-639, 450 feet south of a farm lane, and 400 feet west of the James River:

Ap—0 to 9 inches; dark brown (7.5YR 4/4) loamy sand; weak medium granular structure; very friable; common fine roots; neutral; abrupt smooth boundary.

B1t—9 to 16 inches; strong brown (7.5YR 5/6) fine sandy loam; weak medium subangular blocky structure; very friable; few fine roots; few clay coatings on sand grains; few fine flakes of mica; few opaque minerals; slightly acid; clear smooth boundary.

B21t—16 to 28 inches; yellowish red (5YR 4/6) sandy clay loam; weak medium subangular blocky structure; friable, slightly sticky; few fine roots; few fine continuous horizontal and vertical tubular pores; few thin patchy clay films on faces of peds; few fine flakes of mica; few opaque minerals; slightly acid; clear smooth boundary.

B22t—28 to 36 inches; yellowish red (5YR 4/6) fine sandy loam; weak medium subangular blocky structure; very friable, slightly sticky; few fine roots; many sand grains coated and bridged with clay; few dark stains 1/8 inch thick; few fine flakes of mica; few opaque minerals; slightly acid; gradual wavy boundary.

B3t—36 to 53 inches; yellowish red (5YR 5/6) loamy sand; weak coarse subangular blocky structure; very friable; clay bridging and coatings on sand grains; common fine flakes of mica; few opaque minerals; slightly acid; gradual wavy boundary.

C—53 to 64 inches; strong brown (7.5YR 5/6) sand; single grain; loose; medium acid.

The solum thickness ranges from 40 to 60 inches. The soil ranges from medium acid through neutral. Quartz pebbles make up 0 to 5 percent of the A and B horizons and 0 to 15 percent of the C horizon.

The Ap horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 or 4. It is loamy sand or sandy loam.

The B1t horizon has hue of 7.5YR, value of 4 or 5, and chroma of 4 through 6. It is sandy loam or fine sandy loam.

The B2t horizon has hue of 5YR through 10YR, value of 4 or 5, and chroma of 4 through 8. It is sandy loam, fine sandy loam, or sandy clay loam.

The B3 horizon has hue of 5YR through 10YR, value of 4 or 5, and chroma of 4 through 8. It is loamy sand or loamy fine sand.

The C horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 through 8. It is loamy sand or sand.

The Bojac soils in this survey area are a taxadjunct to the Bojac series because they have a higher base saturation than is defined in the range for the series. This difference does not affect the use and management of the soils.

Bolling series

The soils of the Bolling series are deep and moderately well drained. They formed in loamy fluvial sediments. Bolling soils are on low-lying flats of low river terraces. Slopes range from 0 to 2 percent.

Bolling soils commonly are near Argent, Bojac, and Pamunkey soils. Bolling soils are better drained and have less clay in the subsoil than Argent soils and are not as well drained as Bojac or Pamunkey soils.

Typical pedon of Bolling silt loam, 3/4 mile north of the intersection of VA-653 and VA-602:

Ap—0 to 8 inches; dark yellowish brown (10YR 4/4) silt loam; moderate medium granular structure; friable; many fine roots; common fine and medium pores; common worm channels; few fine manganese concretions; slightly acid; abrupt smooth boundary.

B1t—8 to 12 inches; yellowish brown (10YR 5/6) silt loam; moderate fine subangular blocky structure; friable; common fine roots; many fine and medium pores; few thin patchy clay films on faces of peds; many medium distinct dark brown (7.5YR 4/4) manganese stains; neutral; clear smooth boundary.

B21t—12 to 28 inches; yellowish brown (10YR 5/8) silty clay loam; few fine faint light gray (10YR 7/2) mottles; moderate fine subangular blocky structure; friable, slightly sticky; few fine roots; few fine pores; few thin patchy clay films and pale brown (10YR 6/3) silt coatings on faces of peds; few fine flakes of mica; strongly acid; clear smooth boundary.

B22t—28 to 50 inches; strong brown (7.5YR 5/6) clay loam; common medium distinct light gray (10YR 7/2) mottles; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; common thin patchy clay films and pale brown (10YR 6/3) silt coatings on faces of peds; many fine and medium manganese concretions; few fine flakes of mica; strongly acid; clear smooth boundary.

B3t—50 to 63 inches; strong brown (7.5YR 5/6) loam; common medium distinct light gray (10YR 7/2) mottles; weak coarse subangular blocky structure; few thin patchy clay films on faces of peds; few medium manganese concretions; few fine flakes of mica; strongly acid.

The solum thickness is more than 40 inches. The soil ranges from strongly acid through neutral.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. It is fine sandy loam, loam, or silt loam.

The Bt horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 6 or 8. The B1t horizon is silt loam

or loam. The B2t and B3t horizons are loam, clay loam, or silty clay loam.

The Bolling soils in this survey area are a taxadjunct to the Bolling series because they have more silt in the subsoil and a lower base saturation than defined in the range for the series. These differences do not affect the use and management of the soils.

Bonneau series

The soils of the Bonneau series are deep and well drained. They formed in loamy fluvial and marine sediments. Bonneau soils are on upland ridges and side slopes. Slopes range from 0 to 10 percent.

Bonneau soils commonly are near Emporia, Norfolk, and Slagle soils. The Bonneau soils have a thicker, sandier surface layer than those soils. The Bonneau soils have a thicker subsoil than the Emporia or Slagle soils and are better drained than the Slagle soils.

Typical pedon of Bonneau loamy sand, 0 to 6 percent slopes, 1.2 miles south of the intersection of VA-608 and VA-622, 300 feet west of VA-622:

O1—1 inch to 0; loose pine needles and partially decomposed organic matter.

Ap—0 to 11 inches; grayish brown (10YR 5/2) loamy sand; weak coarse granular structure; very friable; common fine and medium roots; very strongly acid; abrupt smooth boundary.

A2—11 to 25 inches; light yellowish brown (10YR 6/4) loamy sand; weak fine granular structure; very friable; few fine roots; few fine continuous pores; few strong brown (7.5YR 5/6) rounded concretions up to 1/4 inch in diameter; very strongly acid; clear wavy boundary.

B21t—25 to 37 inches; yellowish brown (10YR 5/8) fine sandy loam; weak fine subangular blocky structure; friable; few fine roots; common fine discontinuous pores; common clay bridging between sand grains; very strongly acid; gradual smooth boundary.

B22t—37 to 43 inches; yellowish brown (10YR 5/6) fine sandy loam; weak fine subangular blocky structure; friable; few fine roots; few fine and medium discontinuous pores; common clay bridging between sand grains and clay films along pore channels; very strongly acid; gradual smooth boundary.

B23t—43 to 64 inches; yellowish brown (10YR 5/8) sandy clay loam; few medium distinct strong brown (7.5YR 5/6) mottles and few fine faint light brownish gray (10YR 6/2) mottles; weak fine subangular blocky structure; friable, slightly sticky; few fine roots; few fine and medium discontinuous pores; common thin patchy clay films on faces of peds; very strongly acid; gradual smooth boundary.

B3t—64 to 80 inches; yellowish brown (10YR 5/4) sandy clay loam; few medium distinct light olive brown (2.5Y 5/6) and strong brown (7.5YR 5/6) mottles and few fine faint light brownish gray (10YR 6/2) mottles; weak medium and coarse subangular blocky structure; friable, slightly sticky, slightly plastic; few fine discontinuous pores; few thin patchy clay films on faces of peds; common yellowish red (5YR 5/6) concretions up to 1/2 inch in diameter; few small pockets of clean sand grains in lower part; very strongly acid.

The solum thickness is more than 60 inches. The soil is very strongly acid or strongly acid unless limed.

The A1 or Ap horizon has hue of 7.5YR through 2.5Y or is neutral, value of 3 through 5, and chroma of 0 through 4. The A2 horizon has hue of 10YR or 2.5Y, value of 4 through 8, and chroma of 2 through 6. The A horizon is loamy sand or loamy fine sand.

The B horizon has hue of 7.5YR through 2.5Y, value of 5 through 7, and chroma of 3 through 8. The upper part of the Bt horizon is sandy loam, fine sandy loam, or sandy clay loam. The lower part of the B horizon is sandy loam, sandy clay loam, or sandy clay.

Burrowsville series

The soils of the Burrowsville series are deep and moderately well drained. They formed in loamy fluvial and marine sediments. Burrowsville soils are on upland flats and side slopes. Slopes range from 0 to 6 percent.

Burrowsville soils commonly are near Bonneau, Emporia, and Slagle soils. The Burrowsville soils have a fragipan, which is not characteristic of any of those soils. The Burrowsville soils are not as well drained as the Bonneau or Emporia soils and do not have the thick, sandy surface layer that is characteristic of the Bonneau soils.

Typical pedon of Burrowsville sandy loam, 2 to 6 percent slopes, 3,100 feet southeast of the intersection of VA-611 and VA-658, 1,000 feet east of a farm lane, 15 feet north of the power line right-of-way:

A1—0 to 3 inches; grayish brown (10YR 5/2) sandy loam; weak fine granular structure; very friable; many fine roots; extremely acid; clear smooth boundary.

A2—3 to 14 inches; light yellowish brown (10YR 6/4) sandy loam; moderate fine granular structure; friable; common fine roots; very strongly acid; gradual smooth boundary.

B1t—14 to 25 inches; light yellowish brown (10YR 6/4); sandy loam; many medium distinct yellowish brown (10YR 5/6) mottles and few medium distinct pale brown (10YR 6/3) mottles; weak fine subangular blocky structure; friable; few fine roots; few discontinuous tubular pores; few thin patchy clay films on faces of peds; very strongly acid; clear wavy boundary.

Bx—25 to 38 inches; yellowish brown (10YR 5/6) sandy loam; many coarse distinct light gray (10YR 7/2) and pale brown (10YR 6/3) mottles; moderate coarse prismatic structure parting to moderate thick platy; brittle and firm in place; few discontinuous pores coated with thick clay films; very strongly acid; gradual wavy boundary.

IIB2t—38 to 51 inches; strong brown (7.5YR 5/6) sandy clay loam; many coarse distinct yellowish red (5YR 5/6) mottles and few medium distinct red (2.5YR 5/6) mottles; weak thick platy structure parting to weak fine subangular blocky; firm, slightly sticky; few thin patchy clay films on faces of peds; strongly acid; gradual smooth boundary.

IIC—51 to 70 inches; strong brown (7.5YR 5/6) sandy clay loam; few medium distinct yellowish red (5YR 5/6) and light gray (10YR 7/1) mottles in lower part; massive; firm, slightly sticky; very strongly acid.

The solum thickness ranges from 45 to 70 inches. The soil ranges from extremely acid through strongly acid unless limed. The depth to the fragipan ranges from 20 to 32 inches. Quartz pebbles make up 0 to 15 percent of the solum.

The A1 horizon has hue of 10YR or 2.5Y, value of 3 through 6, and chroma of 2 through 4. The A2 horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 2 through 4. The A horizon is sandy loam or fine sandy loam.

The B1 horizon has hue of 10YR, value of 5 or 6, and chroma of 4 through 6. It is sandy loam or fine sandy loam.

The Bx horizon has hue of 10YR or 2.5Y, value of 4 through 6, and chroma of 2 through 8. It has high- and low-chroma mottles, or it is variegated. It is sandy loam or fine sandy loam.

The B2t horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 through 8. The B2t horizon is sandy loam or sandy clay loam.

The C horizon has the same hue, value, and chroma as the B2t horizon. The C horizon has high- and low-chroma mottles, or it is variegated. It is sandy loam or sandy clay loam.

Catpoint series

The soils of the Catpoint series are deep and somewhat excessively drained. They formed in sandy fluvial sediments. Catpoint soils are mainly on low fluvial terraces along drainageways. Slopes range from 0 to 4 percent.

Catpoint soils commonly are near Levy, Muckalee, and Peawick soils. The Catpoint soils are sandier and better drained than the Levy, Muckalee or Peawick soils.

Typical pedon of Catpoint fine sand, 1-1/2 miles north of the intersection of VA-10 and VA-639, 450 feet east of Powell's Creek:

Ap—0 to 9 inches; dark brown (10YR 4/3) fine sand; weak fine granular structure; very friable; few fine and many medium roots; very strongly acid; clear smooth boundary.

B2—9 to 22 inches; brownish yellow (10YR 6/6) fine sand; weak fine granular structure; very friable; common fine roots; few fine flakes of mica; few grains of feldspar; common fine opaque grains; strongly acid; gradual wavy boundary.

A2&Bt—22 to 32 inches; yellow (10YR 7/6) fine sand; common coarse faint very pale brown (10YR 7/3) mottles; single grain; loose; few fine roots; few fine flakes of mica; few fine grains of feldspar; common fine opaque grains; common discontinuous strong brown (7.5YR 5/6) sandy loam lamellae 1/16 to 1/4 inch thick; few rounded sandy loam concretions; medium acid; gradual smooth boundary.

C1—32 to 62 inches; very pale brown (10YR 7/3) fine sand; few fine faint yellow (10YR 7/6) mottles; massive; very friable; few fine roots; slightly acid; gradual smooth boundary.

C2—62 to 84 inches; light gray (10YR 7/2) stratified sand and coarse sand; single grain; loose; 10 percent quartz pebbles; slightly acid.

The A1 or Ap horizon has hue of 10YR, value of 3 through 5, and chroma of 2 through 4. It is fine sand or sand.

The B2 horizon has hue of 7.5YR or 10YR, value of 4 through 6, and chroma of 4 through 8. It is sand, fine sand, loamy sand, or loamy fine sand. Some pedons do not have a B2 horizon.

The A part of the A&B horizon has hue of 10YR or 2.5Y, value of 6 through 8, and chroma of 2 through 6. It is sand or fine sand. The lamellae, or B part of the A & B horizon, has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 through 8. The lamellae are sandy loam or fine sandy loam. The combined thickness of the lamellae above a depth of 60 inches is less than 6 inches.

The C horizon has hue of 10YR or 2.5Y, value of 5 through 8, and chroma of 1 through 4. It is stratified coarse sand, sand, or fine sand.

Chickahominy series

The soils of the Chickahominy series are deep and poorly drained. They formed in clayey fluvial sediments.

Chickahominy soils are in low-lying areas and depressions along major rivers. Slopes range from 0 to 2 percent.

Chickahominy soils commonly are near Newflat, Peawick, and Wickham soils. The Chickahominy soils are more poorly drained than the Newflat or Peawick soils and are more poorly drained and have more clay in the subsoil than the Wickham soils.

Typical pedon of Chickahominy silt loam, 1-1/2 miles northeast of the intersection of VA-639 and VA-640, 800 feet northwest of the end of VA-639:

O1—2 inches to 0; loose pine needles and partially decomposed forest litter.

A1—0 to 2 inches; grayish brown (10YR 5/2) silt loam; moderate medium granular structure; friable, nonsticky, nonplastic; many fine roots; extremely acid; clear smooth boundary.

A2—2 to 7 inches; light brownish gray (10YR 6/2) silt loam; moderate medium granular structure; friable, slightly sticky, nonplastic; many fine and common medium roots; many fine brown (10YR 4/3) concretions and stains; extremely acid; clear smooth boundary.

B21tg—7 to 16 inches; light brownish gray (2.5Y 6/2) silty clay; many coarse distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm, sticky, plastic; common fine and few medium roots; common continuous clay films on faces of peds; extremely acid; gradual smooth boundary.

B22tg—16 to 38 inches; gray (10YR 6/1) clay; many coarse distinct yellowish brown (10YR 5/6) mottles; weak medium prismatic structure parting to weak very thick platy parting to strong medium and fine subangular blocky; firm, sticky, plastic; few fine roots; few fine pores; common continuous thin clay films on faces of peds; extremely acid; gradual smooth boundary.

B23tg—38 to 68 inches; gray (10YR 6/1) clay; common medium distinct brownish yellow (10YR 6/6) mottles; weak very thick platy structure parting to strong medium and fine subangular blocky; firm, sticky, plastic; few fine roots; thin continuous clay films on faces of peds; extremely acid.

The solum thickness is more than 60 inches. The soil is extremely acid or very strongly acid unless limed. Quartz pebbles make up 0 to 2 percent of the solum.

The A horizon has hue of 10YR or 2.5Y, value of 3 through 6, and chroma of 1 or 2. It is loam or silt loam.

Some pedons have a B1 horizon that is neutral and has value of 4 through 6 or that has hue of 10YR through 5Y, value of 4 through 6, and chroma of 1 or 2. High-chroma mottles are in some pedons. The B1 horizon is loam, silt loam, clay loam, or silty clay loam.

The B2t horizon is neutral and has value of 4 through 7 or has hue of 10YR through 5Y, value of 4 through 7, and chroma of 1 or 2. High-chroma mottles are in most pedons. The B2t horizon is clay loam, silty clay loam, silty clay, or clay.

Emporia series

The soils of the Emporia series are deep and well drained. They formed in stratified loamy and clayey fluvial and marine sediments. Emporia soils are on uplands and side slopes adjacent to drainageways. Slopes range from 2 to 45 percent.

Emporia soils commonly are near Bonneau, Burrowsville, Norfolk, and Slagle soils. The Emporia soils do not have a surface layer that is as thick or as sandy as that of the Bonneau soils, nor do they have a fragipan that is typical of the Burrowsville soils. The Emporia soils have a thinner subsoil than the Norfolk soils and are better drained than the Slagle soils.

Typical pedon of Emporia fine sandy loam, 2 to 6 percent slopes, 1/4 mile north of the intersection of I-95 and VA-35, 250 feet west of Frontage Road:

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak fine granular structure; very friable; many fine roots; slightly acid; abrupt smooth boundary.

B21t—8 to 14 inches; yellowish brown (10YR 5/6) loam; common medium faint light yellowish brown (2.5Y 6/4) mottles; weak fine subangular blocky structure; friable, slightly sticky, nonplastic; common fine roots; many fine pores; few thin patchy clay films on faces of peds; slightly acid; clear smooth boundary.

B22t—14 to 20 inches; yellowish brown (10YR 5/8) loam; weak fine subangular blocky structure; firm, slightly sticky, nonplastic; few fine roots; many fine pores; few thin patchy clay films on faces of peds; strongly acid; gradual smooth boundary.

B23t—20 to 28 inches; yellowish brown (10YR 5/8) clay loam; common medium distinct strong brown (7.5YR 5/6) mottles and few medium faint light yellowish brown (2.5Y 6/4) mottles; weak fine and medium subangular blocky structure; firm, sticky, slightly plastic; few fine roots; many fine pores; common thin patchy clay films on faces of peds; very strongly acid; gradual smooth boundary.

B24t—28 to 40 inches; yellowish brown (10YR 5/8) clay loam; common coarse distinct yellowish red (5YR 5/6) mottles and common medium faint light yellowish brown (10YR 6/4) mottles; weak medium subangular blocky structure; firm, slightly sticky, slightly plastic; few fine roots; few fine pores; common thin patchy clay films on faces of peds; very strongly acid; gradual smooth boundary.

B3t—40 to 50 inches; yellowish brown (10YR 5/6) sandy clay loam; common fine faint light gray (10YR 7/1) mottles and few medium distinct red (2.5YR 5/6) mottles; weak thick platy structure parting to weak fine subangular blocky; firm, slightly sticky, slightly plastic; few fine roots; few fine pores; few thin patchy clay films on faces of peds; very strongly acid; gradual smooth boundary.

C—50 to 64 inches; yellowish brown (10YR 5/6) sandy clay loam; pockets of sandy loam; many coarse distinct light gray (10YR 7/1) mottles and common medium distinct red (2.5YR 5/6) mottles; massive; friable, slightly sticky, slightly plastic; very strongly acid.

The solum thickness ranges from 40 to 60 inches. The soil is strongly or very strongly acid unless limed. Quartz pebbles make up 0 to 10 percent of the solum and substratum.

The A1 or Ap horizon has hue of 10YR or 2.5Y, value of 4 through 6, and chroma of 2 through 4. Some pedons have an A2 horizon that has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 3 or 4. The A horizon is fine sandy loam or loam.

The upper part of the B2t horizon has hue of 5YR through 10YR, value of 4 through 6, and chroma of 3 through 8. It is loam, sandy clay loam, or clay loam. The lower part of the B2t horizon and the B3t horizon have hue of 7.5YR through 2.5Y, value of 4 through 6, and chroma of 3 through 8, and they are mottled. The lower part of the B2t horizon and the B3t horizon are sandy loam, sandy clay loam, clay loam, or sandy clay.

The C horizon is neutral and has value of 3 through 8 or has hue of 7.5YR through 2.5Y, value of 3 through 8, and chroma of 1 through 8 and is mottled. The texture of the horizon is variable and ranges from sandy loam to clay loam.

Kinston series

The soils of the Kinston series are deep and poorly drained. They formed in loamy fluvial sediments. Kinston soils are on flood plains. Slopes range from 0 to 2 percent.

Kinston soils commonly are near Ackwater, Montross, Rains, and Slagle soils. Kinston soils are flooded and do not have a well developed subsoil, which is characteristic of all of the other soils.

Typical pedon of Kinston loam in an area of Kinston complex, 1,600 feet southwest of the intersection of VA-616 and VA-156, 150 feet west of VA-156:

A11—0 to 4 inches; dark grayish brown (10YR 4/2) loam; weak medium granular structure; friable; many fine and medium roots; very strongly acid; clear smooth boundary.

A12g—4 to 7 inches; light brownish gray (10YR 6/2) loam; few fine distinct brownish yellow (10YR 6/6) mottles; weak medium granular structure; friable; many fine roots; very strongly acid; clear smooth boundary.

C1g—7 to 14 inches; light gray (10YR 6/1) clay loam; many medium distinct yellowish brown (10YR 5/8) mottles; massive in place, parting to weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; strongly acid; clear wavy boundary.

C2g—14 to 40 inches; light gray (10YR 6/1) clay loam; many medium distinct brownish yellow (10YR 6/8) mottles; massive in place, parting to weak medium subangular blocky structure; firm, sticky, plastic; few fine roots; strongly acid; clear wavy boundary.

C3g—40 to 49 inches; light gray (10YR 6/1) clay loam; few medium distinct yellowish brown (10YR 5/8) mottles; massive in place, parting to weak coarse subangular blocky structure; firm, very sticky, very plastic; very strongly acid; gradual wavy boundary.

C4g—49 to 62 inches; light gray (10YR 6/1) clay loam; massive; firm, very sticky, very plastic; very strongly acid.

The thickness of the loamy sediments is more than 40 inches. The soil is very strongly acid or strongly acid.

The A horizon is neutral and has value of 4 through 6 or has hue of 10YR, value of 4 through 6, and chroma of 1 or 2. It is fine sandy loam, loam, or silt loam.

The C horizon is neutral and has value of 4 through 6 or has hue of 10YR or 2.5Y, value of 4 through 6, and chroma of 1 or 2. It is sandy loam, loam, clay loam, or sandy clay loam.

Levy series

The soils of the Levy series are deep and very poorly drained. They formed in clayey fluvial sediments. Levy soils are on tidal marshes along creeks and rivers. They are inundated twice daily by freshwater. Slopes are less than 1 percent.

Levy soils commonly are near Muckalee soils. The Levy soils are flooded more frequently than the Muckalee soils.

Typical pedon of Levy silt loam, 2 miles north-northwest of the intersection of VA-653 and VA-602, in Kennon Marsh, 800 feet northeast of a cultivated field:

A1—0 to 6 inches; dark gray (10YR 4/1) silt loam; massive; sticky, slightly plastic; flows easily between fingers when squeezed; about 20 percent live roots, by volume; about 10 percent organic matter, by volume; very strongly acid; clear smooth boundary.

C1g—6 to 22 inches; dark gray (10YR 4/1) silty clay; massive; sticky, slightly plastic; flows easily between fingers when squeezed; about 20 percent live roots, by volume; many fine fibers and pockets of organic (sapric) material; very strongly acid; clear smooth boundary.

C2g—22 to 43 inches; very dark gray (10YR 3/1) silty clay; massive; sticky, slightly plastic; flows easily between fingers when squeezed; about 10 percent live roots, by volume; many fine fibers and pockets of organic (sapric) material; very strongly acid; clear smooth boundary.

C3g—43 to 60 inches; very dark grayish brown (10YR 3/2) silty clay; massive; sticky, slightly plastic; flows easily between fingers when squeezed; common fine fibers and pockets of organic (sapric) material; very strongly acid.

The soil has an *n* value greater than 0.7 in all mineral layers between the surface and a depth of 40 inches. The soil is very strongly acid or strongly acid.

The A horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 1 or 2. It is silt loam or silty clay loam.

The C horizon has hue of 10YR through 5Y, value of 3 through 5, and chroma of 1 or 2. It is mainly clay or silty clay. Some pedons have thin strata of clay loam. Fragments of wood, logs, or buried stumps are in some pedons.

Lynchburg series

The soils of the Lynchburg series are deep and somewhat poorly drained. They formed in loamy fluvial and marine sediments. Lynchburg soils are on low-lying uplands and at the heads of drainageways. Slopes range from 0 to 2 percent.

Lynchburg soils commonly are near Aycock, Montross, Norfolk, Slagle, and Rains soils. The Lynchburg soils are not as well drained as the Aycock, Montross, Norfolk, or Slagle soils, and have more sand and less silt in the subsoil than the Aycock or Montross soils. The Lynchburg soils are better drained than the Rains soils.

Typical pedon of Lynchburg loam, 400 feet northwest of the intersection of VA-608 and VA-628, 75 feet north of VA-608:

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) loam; moderate fine granular structure; friable, slightly sticky, nonplastic; many fine roots; strongly acid; abrupt smooth boundary.

B21t—9 to 16 inches; light olive brown (2.5Y 5/4) loam; many medium distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable, sticky, slightly plastic; common fine roots; common fine discontinuous pores within peds; few thin patchy clay films on faces of peds; very strongly acid; clear smooth boundary.

B22tg—16 to 24 inches; light brownish gray (10YR 6/2) loam; many medium distinct yellowish brown (10YR 5/6) mottles; weak thick platy structure parting to weak fine subangular blocky; friable, sticky, slightly plastic; few fine roots on outside of peds; common medium discontinuous pores on outside of peds; few thin patchy clay films on faces of peds; very strongly acid; gradual smooth boundary.

B23tg—24 to 41 inches; light gray (10YR 6/1) loam; many coarse distinct strong brown (7.5YR 5/6) mottles; weak coarse prismatic structure parting to very thick platy parting to weak medium subangular blocky; firm, sticky, slightly plastic; few fine discontinuous pores on outside of peds; few thin patchy clay films on faces of peds and within pore channels; very strongly acid; gradual smooth boundary.

B24tg—41 to 52 inches; light gray (10YR 6/1) loam; common medium distinct light yellowish brown (2.5Y 6/4) mottles and common coarse distinct strong brown (7.5YR 5/6) mottles; weak coarse prismatic structure parting to weak medium subangular blocky; firm, sticky, slightly plastic; few fine discontinuous pores on outside of peds; few thin patchy clay films on faces of peds and within pore channels; very strongly acid; clear smooth boundary.

B25tg—52 to 65 inches; light gray (10YR 6/1) clay loam; many coarse distinct strong brown (7.5YR 5/6) mottles and many medium distinct red (2.5YR 4/8) mottles; weak medium subangular blocky structure; firm, sticky, slightly plastic; few thin patchy clay films on faces of peds; very strongly acid.

The solum thickness is more than 60 inches. The soil is very strongly acid or strongly acid unless limed.

The A horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 1 or 2. It is fine sandy loam or loam.

The B21t horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 3 through 8. It has few to many high- and low-chroma mottles. The rest of the B horizon has hue of 10YR or 2.5Y, value of 4 through 7, and chroma of 1 or 2. The B2t horizon is sandy clay loam, loam, or clay loam.

The Lynchburg soils in this survey area are a taxadjunct to the Lynchburg series because they have more silt than is defined in the range for the series. This difference does not affect the use and management of the soils.

Montross series

The soils of the Montross series are deep and moderately well drained. They formed in silty fluvial and marine sediments. Montross soils are on broad uplands and side slopes. Slopes range from 0 to 6 percent.

Montross soils commonly are near Ackwater, Aycock, Lynchburg, and Slagle soils. The Montross soils have

less clay in the subsoil than the Ackwater soils, are not as well drained as the Aycock soils, and have more silt in the subsoil than the Lynchburg or Slagle soils.

Typical pedon of Montross silt loam, 0 to 2 percent slopes, about 4,600 feet south of the junction of VA-636 and VA-686, and 50 feet east of VA-686:

O1—1 inch to 0; loose pine needles and partially decomposed forest litter.

Ap—0 to 7 inches; light yellowish brown (2.5Y 6/4) silt loam; weak fine granular structure; friable, slightly sticky, slightly plastic; common fine and few medium roots; strongly acid; abrupt smooth boundary.

B21t—7 to 16 inches; yellowish brown (10YR 5/6) silt loam; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; few fine pores; few thin patchy clay films on faces of peds; very strongly acid; gradual smooth boundary.

B22t—16 to 26 inches; yellowish brown (10YR 5/6) silt loam; many medium distinct light yellowish brown (10YR 6/4), pale brown (10YR 6/3), and light gray (10YR 6/1) mottles; weak thick platy structure parting to weak fine angular blocky; friable, slightly sticky, plastic; few fine roots along faces of plates; few fine pores; few thin patchy clay films on faces of peds; very strongly acid; gradual smooth boundary.

B23t—26 to 33 inches; yellowish brown (10YR 5/6) silty clay loam; many medium distinct light yellowish brown (2.5Y 6/4) mottles and few common distinct light gray (10YR 7/1) mottles; weak very thick platy structure parting to weak fine angular blocky; very firm in place, up to 50 percent of the volume brittle; sticky, plastic; few fine roots in old root channels; few fine pores; common thin patchy clay films on faces of peds; very strongly acid; gradual smooth boundary.

B24t—33 to 50 inches; mottled light yellowish brown (2.5Y 6/4), light gray (10YR 7/1), and red (2.5YR 5/6) silty clay loam; weak very thick platy structure parting to weak fine angular blocky; extremely hard and firm in place, up to 30 percent of the volume brittle; sticky, plastic; few fine roots in old root channels; common thin patchy clay films on faces of peds; very strongly acid; gradual smooth boundary.

B3t—50 to 86 inches; light brownish gray (10YR 6/2) silty clay; many coarse distinct yellowish brown (10YR 5/6) and dark red (2.5YR 3/6) mottles; weak coarse subangular blocky structure; firm, very sticky, very plastic; few thin patchy clay films on faces of peds; very strongly acid.

The solum thickness is more than 60 inches. The soil ranges from extremely acid through strongly acid unless limed. The depth to the compact layer with platy structure ranges from 20 to 40 inches. Some pedons have subhorizons in the lower part of the B and C horizons that are as much as 5 percent pebbles.

The A horizon has hue of 10YR or 2.5Y, value of 4 through 6, and chroma of 2 through 4. It is silt loam or loam.

The upper part of the B2t horizon, above the compact layer, has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 4 through 8. It is silt loam or silty clay loam. The lower part of the B2t horizon and the B3t horizon have hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 through 6. Some pedons do not have a dominant matrix color, and they are mottled brown red, gray, and yellow. They are clay loam, silty clay loam, or silty clay. Structure commonly is platy, and the consistence is firm or very firm and compact.

Muckalee series

The soils of the Muckalee series are deep and poorly drained. They formed in loamy and sandy fluvial sediments. Muckalee soils are on flood plains. Slopes range from 0 to 2 percent.

Muckalee soils commonly are near Bojac, Bolling, Levy, and Pamunkey soils. The Muckalee soils are not as well drained as the Bojac, Bolling, or Pamunkey soils and are generally not flooded twice daily by tides as are the Levy soils.

Typical pedon of Muckalee loam, 1-1/4 miles east-northeast of the end of VA-639 at Flowerdew Hundred Farm, 200 feet east of a power transmission line, and 300 feet west of the James River:

O1—1 inch to 0; loose leaves and twigs and partially decomposed forest litter.

A1—0 to 14 inches; dark gray (10YR 4/1) loam; weak medium granular structure; friable; many fine and medium roots; medium acid; clear smooth boundary.

C1g—14 to 20 inches; dark gray (10YR 4/1) sandy loam; weak medium granular structure; friable; common fine roots; medium acid; clear smooth boundary.

C2g—20 to 48 inches; olive gray (5Y 4/2) sandy loam; common medium distinct olive yellow (2.5Y 6/6) mottles; massive; friable; few fine roots; medium acid; clear smooth boundary.

C3g—48 to 60 inches; olive gray (5Y 4/2) sandy loam; common fine distinct yellowish brown (10YR 5/6) mottles; massive; friable; medium acid.

The A horizon ranges from strongly acid through slightly acid, and the C horizon ranges from medium acid through neutral.

The A horizon has hue of 10YR or 2.5Y, value mainly of 3 through 5, and chroma of 1 or 2. In areas where it is less than 6 inches thick, the value is 3. The A horizon is loam or sandy loam.

The C horizon has hue of 10YR through 5Y, value of 4 through 6, and chroma of 1 or 2. It has few to many strata or mottles of yellow, brown, or gray. The C horizon mainly is loamy sand or sandy loam. Some pedons have

strata of sandy clay loam, clay loam, or sand less than 3 inches thick.

The Muckalee soils in this survey area are a taxadjunct to the Muckalee series because they have more weatherable minerals than is defined in the range for the series. This difference does not affect the use and management of the soils.

Newflat series

The soils of the Newflat series are deep and somewhat poorly drained. They formed in clayey fluvial sediments. Newflat soils are on terraces and low-lying flats along major rivers. Slopes range from 0 to 2 percent.

Newflat soils commonly are near Chickahominy, Peawick, and Wickham soils. The Newflat soils are better drained than the Chickahominy soils, are more poorly drained than the Peawick soils, and are more poorly drained and have more clay in the subsoil than the Wickham soils.

Typical pedon of Newflat silt loam, 1,800 feet southwest of the intersection of VA-10 and VA-616, 75 feet south of VA-616:

O1—1 inch to 0; leaf litter and partially decomposed organic materials.

A1—0 to 2 inches; very dark gray (10YR 3/1) silt loam; moderate fine granular structure; very friable; many fine and common medium roots; extremely acid; clear smooth boundary.

A2—2 to 5 inches; light brownish gray (10YR 6/2) silt loam; few fine faint light yellowish brown (10YR 6/4) mottles and few fine distinct yellowish brown (10YR 5/6) mottles; moderate fine granular structure; very friable, slightly sticky; common fine roots; extremely acid; gradual smooth boundary.

B1t—5 to 10 inches; light yellowish brown (10YR 6/4) clay loam; few fine distinct light gray (10YR 7/1) mottles and many coarse faint brownish yellow (10YR 6/6) mottles; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; thin patchy clay films on faces of peds; extremely acid; gradual smooth boundary.

B21tg—10 to 20 inches; light brownish gray (10YR 6/2) clay loam; common medium distinct yellowish brown (10YR 5/6) and strong brown (7.5YR 5/6) mottles; moderate medium prismatic structure parting to moderate fine and medium angular blocky; firm, very sticky, plastic; few fine roots; thin continuous clay films on faces of peds; extremely acid; gradual smooth boundary.

B22tg—20 to 35 inches; gray (10YR 6/1) clay loam; common medium distinct yellowish brown (10YR 5/6) and strong brown (7.5YR 5/6) mottles; moderate medium prismatic structure parting to moderate fine and medium angular blocky; firm, very sticky, very plastic; few fine roots; thin continuous clay films on faces of peds; extremely acid; gradual smooth boundary.

B23tg—35 to 75 inches; light gray (10YR 6/1) silty clay; common medium distinct strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; firm, very sticky, very plastic; thin patchy clay films on faces of peds; extremely acid.

The solum thickness is more than 60 inches. The soil is extremely acid or very strongly acid unless limed.

The A1 or Ap horizon is neutral and has value of 3 through 5 or has hue of 10YR or 2.5Y, value of 3 through 5, and chroma of 1 or 2. The A2 horizon has hue of 10YR or 2.5Y, value of 5 through 7, and chroma of 2 through 4. The A horizon is loam or silt loam.

The upper part of the B horizon has hue of 10YR through 5Y, value of 5 or 6, and chroma of 3 through 6. The lower part of the B horizon is neutral and has value of 4 through 7 or has hue of 10YR through 5Y, value of 4 through 7, and chroma of 1 or 2. It is loam, silt loam, clay loam, or silty clay loam. The B2t horizon is clay loam, silty clay loam, silty clay, or clay.

Some pedons have a B3 horizon that is similar in hue, value, and chroma to the lower part of the B2t horizon. The B3 horizon is loam, silt loam, sandy clay loam, clay loam, or clay.

The C horizon is neutral and has value of 4 through 7 or has hue of 10YR through 5Y, value of 4 through 7, and chroma of 1 or 2. It ranges from fine sandy loam to clay.

Norfolk series

The soils of the Norfolk series are deep and well drained. They formed in loamy fluvial and marine sediments. Norfolk soils are on broad uplands. Slopes range from 0 to 2 percent.

Norfolk soils commonly are near Bonneau, Burrowsville, Emporia, and Slagle soils. The Norfolk soils do not have the thick, sandy surface layer that is characteristic of the Bonneau soils and do not have the fragipan that is characteristic of the Burrowsville soils. The Norfolk soils have a thicker subsoil than the Emporia or Slagle soils and are better drained than the Burrowsville or Slagle soils.

Typical pedon of Norfolk fine sandy loam, 1.1 miles south of the intersection of VA-608 and VA-622, 500 feet west of VA-622:

O1—1 inch to 0; partially decomposed pine needles and twigs.

Ap—0 to 9 inches; grayish brown (10YR 5/2) fine sandy loam; weak fine granular structure; very friable; many fine and medium roots; many worm casts; medium acid; abrupt smooth boundary.

A2—9 to 16 inches; pale brown (10YR 6/3) fine sandy loam; weak medium granular structure; very friable; many fine and medium roots; common fine pores; medium acid; clear smooth boundary.

B1—16 to 20 inches; yellowish brown (10YR 5/6) fine sandy loam; weak medium subangular blocky structure; friable, slightly sticky; common fine roots; many fine pores; few thin patchy clay films on faces of peds and clay bridging between sand grains; medium acid; clear smooth boundary.

B21t—20 to 27 inches; yellowish brown (10YR 5/6) sandy clay loam; weak medium and fine subangular blocky structure; friable, slightly sticky; few fine roots; common fine pores; few thin patchy clay films on face of peds; strongly acid; gradual smooth boundary.

B22t—27 to 38 inches; yellowish brown (10YR 5/8) sandy clay loam; weak medium subangular blocky structure; friable, slightly sticky; few fine roots; few fine pores; common thin patchy clay films on faces of peds; strongly acid; gradual smooth boundary.

B23t—38 to 70 inches; yellowish brown (10YR 5/6) sandy clay loam; many medium distinct yellowish red (5YR 4/8) mottles; weak medium subangular blocky structure; friable, slightly sticky; few fine roots; common thin patchy clay films on faces of peds; strongly acid; gradual smooth boundary.

C—70 to 98 inches; mottled strong brown (7.5YR 5/8), red (2.5YR 4/8), and light gray (10YR 7/1) sandy clay loam; massive; friable, brittle in places, slightly sticky; few fine red nodules; very strongly acid.

The solum thickness ranges from 60 to 90 inches. The soil is very strongly acid or strongly acid unless limed. Coarse fragments up to 1/2 inch in diameter make up 0 to 5 percent of the soil.

The A1 or Ap horizon has hue of 10YR or 2.5Y, value of 4 through 6, and chroma of 2 through 4. The A2 horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 3 or 4. The A horizon is loamy sand, sandy loam, or fine sandy loam.

The B1 horizon has hue of 10YR, value of 5, and chroma of 6 or 8. It is fine sandy loam.

The B2t horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 6 or 8. It is sandy loam or sandy clay loam.

The C horizon commonly is mottled strong brown, red, gray, or yellow. It ranges from sandy loam to clay.

Pamunkey series

The soils of the Pamunkey series are deep and well drained. They formed in loamy fluvial sediments. Pamunkey soils are on low stream terrace uplands and side slopes. Slopes range from 0 to 6 percent.

Pamunkey soils commonly are near Argent, Bojac, and Bolling soils. The Pamunkey soils are better drained than the Argent or Bolling soils and have more clay in the subsoil than the Bojac soils.

Typical pedon of Pamunkey loam, 0 to 2 percent slopes, 3/4 mile northeast of the end of VA-639 and 300 feet south of the James River:

Ap—0 to 10 inches; brown (10YR 4/3) loam; strong medium granular structure; friable; many fine roots; few rounded and angular pebbles; moderately alkaline; clear smooth boundary.

A2—10 to 16 inches; yellowish brown (10YR 5/4) loam; common medium distinct dark grayish brown (10YR 4/2) mottles; weak fine granular structure; friable; common fine roots; few fine pores and worm casts; few rounded and angular pebbles; neutral; gradual smooth boundary.

B21t—16 to 29 inches; strong brown (7.5YR 5/6) clay loam; moderate medium subangular blocky structure; friable, slightly sticky; common fine roots; few fine pores; few thin patchy clay films on faces of peds; few fine concretions; neutral; gradual smooth boundary.

B22t—29 to 42 inches; strong brown (7.5YR 5/8) clay loam; moderate medium subangular blocky structure; friable, slightly sticky; few fine roots; few krotovina; common thin patchy clay films on faces of peds; common dark concretions; common fine flakes of mica; neutral; gradual smooth boundary.

B3t—42 to 55 inches; strong brown (7.5YR 5/8) sandy clay loam; weak medium and coarse subangular blocky structure; friable, slightly sticky; few fine roots; few thin patchy clay films on faces of peds; few fine dark concretions; few fine flakes of mica; neutral; gradual smooth boundary.

C—55 to 72 inches; strong brown (7.5YR 5/8) fine sandy loam; strata of sandy clay loam and clay loam; few medium distinct light brownish gray (10YR 6/2) mottles; massive; friable; few fine roots in upper part; few dark concretions; few fine flakes of mica; neutral.

The solum thickness ranges from 40 to 60 inches. In unlimed areas the soil ranges from very strongly acid through medium acid in the A horizon and upper part of the B horizon, and from medium acid through neutral in the lower part of the B horizon and in the C horizon. Pebbles up to 3/4 inch in diameter make up 0 to 10 percent of the soil.

The Ap horizon has hue of 7.5YR or 10YR, value of 3 through 5, and chroma of 2 through 4. The A2 horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 2 through 4. The A horizon is loam or fine sandy loam. Some pedons do not have an A2 horizon.

The B2t horizon has hue of 5YR or 7.5YR, value of 4 through 6, and chroma of 4 through 8. It is sandy clay loam or clay loam.

The B3 horizon has the same hue, value, and chroma as the B2t horizon. The B3 horizon is sandy loam, fine sandy loam, or sandy clay loam.

The C horizon has the same hue, value, and chroma as the B2t horizon. The C horizon mainly is loamy sand, sandy loam, or fine sandy loam. It commonly has strata of sandy clay loam or clay loam.

Peawick series

The soils of the Peawick series are deep and moderately well drained. They formed in clayey fluvial sediments. Peawick soils are on stream terraces on uplands and side slopes. Slopes range from 0 to 10 percent.

Peawick soils commonly are near Chickahominy, Newflat, and Wickham soils. The Peawick soils are better drained than the Chickahominy or Newflat soils, and have more clay and silt in the subsoil than and are not as well drained as the Wickham soils.

Typical pedon of Peawick silt loam, 0 to 2 percent slopes, 1.2 miles northeast of the intersection of VA-639 and VA-640, 1,200 feet east of VA-639:

O1—1/2 inch to 0; loose leaves and pine needles and partially decomposed forest litter.

A1—0 to 3 inches; grayish brown (10YR 5/2) silt loam; weak fine granular structure; nonsticky, nonplastic; common fine roots; very strongly acid; abrupt smooth boundary.

B1t—3 to 8 inches; olive yellow (2.5Y 6/6) silty clay loam; moderate medium subangular blocky structure; friable, slightly sticky, nonplastic; few fine roots; few fine pores; few thin patchy clay films on faces of peds; very strongly acid; gradual smooth boundary.

B21t—8 to 15 inches; yellowish brown (10YR 5/6) silty clay; weak medium prismatic structure parting to moderate fine subangular blocky; friable, sticky, slightly plastic; few fine roots; few fine pores; few thin continuous light yellowish brown (2.5Y 6/4) clay films on faces of peds; very strongly acid; gradual smooth boundary.

B22t—15 to 20 inches; brownish yellow (10YR 6/6) clay; few fine distinct reddish yellow (5YR 6/8) mottles; moderate medium prismatic structure parting to moderate fine angular blocky; firm, sticky, plastic; few fine roots; few very fine pores; common thin continuous light yellowish brown (2.5Y 6/4) clay films on faces of peds; very strongly acid; gradual smooth boundary.

B23t—20 to 30 inches; yellowish brown (10YR 5/8) clay; common medium distinct light brownish gray (2.5Y 6/2) mottles; moderate coarse prismatic structure parting to moderate fine angular blocky; firm, very sticky, plastic; few fine roots; common thin continuous olive yellow (2.5Y 6/8) clay films on faces of peds; very strongly acid; gradual smooth boundary.

B24t—30 to 50 inches; yellowish brown (10YR 5/8) clay; many coarse distinct light gray (10YR 6/1) mottles; weak coarse prismatic structure parting to moderate medium angular blocky; firm, very sticky, plastic; few fine roots; common thin continuous olive yellow (2.5Y 6/8) clay films on faces of peds; very strongly acid; gradual smooth boundary.

B3tg—50 to 76 inches; gray (10YR 6/1) silty clay; many coarse distinct yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; firm, very sticky, plastic; few fine roots; few thin patchy clay films on faces of peds; very strongly acid.

The solum thickness is more than 60 inches. The soil is extremely acid or very strongly acid unless limed. Quartz pebbles make up 0 to 2 percent of the soil.

The A horizon has hue of 10YR or 2.5Y, value of 4 through 6, and chroma of 1 through 4. It mainly is loam or silt loam. In eroded areas it is clay loam or silty clay loam.

The B1 horizon has hue of 10YR or 2.5Y, value of 4 through 6, and chroma of 4 through 8. It is clay loam or silty clay loam.

The upper part of the B2t horizon has hue of 7.5YR through 2.5Y, value of 5 or 6, and chroma of 4 through 8. The lower part of the B2t horizon and the B3 horizon are neutral and have value of 5 through 7; or have hue of 10YR through 5Y, value of 5 through 7, and chroma of 1 through 8; or they are multicolored. The B2t and B3 horizons are silty clay loam, silty clay, or clay.

Rains series

The soils of the Rains series are deep and poorly drained. They formed in loamy fluvial and marine sediments. Rains soils are on low-lying upland flats and in slight depressions. Slopes range from 0 to 2 percent.

Rains soils commonly are near Aycock, Lynchburg, and Montross soils. The Rains soils are not as well drained as any of those soils, and they have more sand and less silt in the subsoil than the Aycock or Montross soils.

Typical pedon of Rains loam, 1 mile south of Richard Bland College, 300 feet south of the intersection of VA-622 and VA-608, 15 feet east of VA-622:

O1—1 inch to 0; partially decomposed pine needles and hardwood leaf litter.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) loam; weak fine granular structure; friable; many fine medium and large roots; very strongly acid; abrupt smooth boundary.

A2—8 to 13 inches; light gray (10YR 6/1) loam; few fine distinct yellowish brown (10YR 5/8) mottles; weak fine granular structure; friable, slightly sticky; common fine and medium roots; strongly acid; gradual smooth boundary.

B1tg—13 to 18 inches; light brownish gray (10YR 6/2) loam; many medium distinct yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; friable, slightly sticky; few fine roots; thin clay coatings on sand grains and clay bridging between sand grains; strongly acid; gradual smooth boundary.

B21tg—18 to 31 inches; light brownish gray (10YR 6/2) loam; many medium distinct yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; friable, slightly sticky; few fine roots; common fine pores; few thin patchy clay films on faces of peds; strongly acid; gradual smooth boundary.

B22tg—31 to 40 inches; gray (10YR 6/1) loam; many coarse distinct strong brown (7.5YR 5/6) mottles; weak fine and medium subangular blocky structure; friable; slightly sticky; few fine roots; few fine pores; few thin patchy clay films on faces of peds; strongly acid; gradual smooth boundary.

B23tg—40 to 48 inches; gray (10YR 6/1) loam; many coarse prominent strong brown (7.5YR 5/6) and red (2.5YR 4/8) mottles; weak medium subangular blocky structure; friable, slightly sticky; few fine pores; few thin patchy clay films on faces of peds; strongly acid; gradual smooth boundary.

B3tg—48 to 62 inches; gray (10YR 6/1) loam; interfingering clay loam; many coarse distinct strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; friable, slightly sticky; few fine pores; few thin patchy clay films on faces of peds; strongly acid; gradual wavy boundary.

Cg—62 to 99 inches; gray (10YR 6/1) stratified loamy fine sand, loam, and clay loam; few fine prominent yellowish brown (10YR 5/8) mottles; massive; very friable; strongly acid.

The solum thickness is more than 60 inches. The soil is very strongly acid or strongly acid unless limed.

The A1 or Ap horizon is neutral and has value of 2 through 4 or has hue of 10YR or 2.5Y, value of 2 through 4, and chroma of 1 or 2. The A2 horizon is neutral and has value of 4 through 6 or has hue of 10YR or 2.5Y, value of 4 through 6, and chroma of 1 or 2. The A horizon is loam or fine sandy loam.

The B1 and B2 horizons are neutral and have value of 4 through 7 or have hue of 10YR or 2.5Y, value of 4 through 7, and chroma of 1 or 2. They are loam or clay loam.

The B3g horizon is neutral and has value of 4 through 7 or has hue of 10YR, value of 4 through 7, and chroma of 1. It has few to many high-chroma mottles. It is loam, clay loam, or sandy clay.

The C horizon has hue of 10YR, value of 5 through 7, and chroma of 1. In some pedons it has high-chroma mottles. It commonly is stratified. It mainly ranges from loamy fine sand to sandy clay but is also loam and clay loam.

The Rains soils in this survey area are a taxadjunct to the Rains series because they have more silt than is defined in the range for the series. This does not affect the use and management of the soils.

Slagle series

The soils of the Slagle series are deep and moderately well drained. They formed in loamy fluvial and marine sediments. Slagle soils are on uplands and on side slopes of narrow drainageways. Slopes range from 0 to 15 percent.

Slagle soils commonly are near Burrowsville, Bonneau, Emporia, and Norfolk soils. The Slagle soils do not have the fragipan typical of the Burrowsville soils; are not as well drained as and do not have the thick, sandy surface layer that is characteristic of the Bonneau soils; and are more poorly drained than the Emporia or Norfolk soils.

Typical pedon of Slagle sandy loam, 0 to 2 percent slopes, 1.1 miles northeast of the intersection of VA-156 and VA-638, 900 feet south of Warwick Swamp:

Ap—0 to 10 inches; grayish brown (10YR 5/2) sandy loam; weak fine granular structure; very friable; common very fine roots; few very fine discontinuous pores; neutral; abrupt smooth boundary.

B21t—10 to 16 inches; light yellowish brown (10YR 6/4) sandy loam; weak fine subangular blocky structure; friable, slightly sticky; few very fine roots; few very fine discontinuous pores; few thin patchy clay films on faces of peds; medium acid; clear smooth boundary.

B22t—16 to 21 inches; yellowish brown (10YR 5/6) sandy loam; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine roots; common fine discontinuous pores; few thin patchy clay films on faces of peds; very strongly acid; clear smooth boundary.

B23t—21 to 26 inches; yellowish brown (10YR 5/6) sandy clay loam; common medium distinct strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; friable, sticky, slightly plastic; few very fine roots; common fine discontinuous pores; few thin continuous clay films on faces of peds; very strongly acid; clear smooth boundary.

B24t—26 to 36 inches; light yellowish brown (10YR 6/4) sandy clay loam; many coarse distinct strong brown (7.5YR 5/6) and light brownish gray (10YR 6/2) mottles; weak thick platy structure parting to moderate fine subangular blocky; friable, sticky, slightly plastic; few very fine roots; common fine discontinuous pores; clay bridging on sand grains and clay coatings on faces of peds; very strongly acid; gradual smooth boundary.

B3tg—36 to 48 inches; light gray (10YR 6/1) sandy clay loam; many coarse distinct strong brown (7.5YR 5/6) and light yellowish brown (2.5Y 6/4) mottles; weak coarse subangular blocky structure; friable, slightly sticky, slightly plastic; common fine discontinuous pores; clay bridging between sand grains, clay coatings on faces of peds; very strongly acid; gradual smooth boundary.

Cg—48 to 65 inches; light gray (10YR 6/1) sandy loam; common coarse distinct yellowish brown (10YR 5/6) mottles; massive; friable, slightly sticky; very strongly acid.

The solum thickness ranges from 40 to 60 inches. The soil is very strongly acid or strongly acid unless limed. Angular and rounded quartz fragments 1/4 to 3/4 inch in diameter make up 0 to 5 percent of the A and B horizons and 0 to 15 percent of the C horizon.

The Ap or A1 horizon has hue of 10YR or 2.5Y, value of 4 through 6, and chroma of 2 through 4. Some pedons have an A2 horizon that has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 3 or 4. The A horizon is sandy loam, fine sandy loam, or loam.

Some pedons have a B1 horizon that has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 4 through 6. It is sandy loam or loam.

The upper part of the B2t horizon has hue of 7.5YR or 10YR, value of 5 through 7, and chroma of 4 through 8. The lower part of the B2t horizon and the B3 horizon have hue of 7.5YR through 2.5Y, value of 4 or 6, and chroma of 1 through 8; or they are mottled or variegated in red, brown, yellow, olive, or gray. The B2t and B3 horizons mainly are sandy loam, sandy clay loam, loam, or clay loam. The lower part of the B2t horizon is sandy clay in some pedons.

The C horizon is gray or is mottled or variegated in red, yellow, brown, olive, or gray. The texture ranges from loamy sand to clay. The C horizon is stratified in some pedons.

Udorthents

Udorthents consist of deep, nearly level to very steep, loamy and clayey soil material that is well drained and moderately well drained. Udorthents are mainly on ridges and side slopes along drainageways and consist mostly of areas that have been quarried for sand, gravel, or fill material. Some areas have been excavated to a depth of 30 feet or more, and some have been filled with a combination of soil material and nonsoil material. Areas of Udorthents are throughout the survey area, but most are in or near urban and industrial centers. Slopes range from 0 to 50 percent.

Udorthents commonly are near Ackwater, Emporia, Slagle, Pamunkey, Peawick, and Wickham soils. All those soils have a well defined subsoil.

Because of the variability of Udorthents, a typical pedon is not given. Udorthents are more than 40 inches thick. The material ranges mainly from extremely acid through strongly acid, but some areas near the Appomattox River are neutral. Quartz pebbles and ironstone fragments make up as much as 50 percent of some pedons, and common fine flakes of mica are in some pedons.

The surface layer has hue of 10YR or 2.5Y, value of 3 through 5, and chroma of 2 or 3. It ranges from loamy sand to clay. The surface layer commonly is about 2 to 5 inches thick, but it ranges from 2 to 10 inches thick.

The lower layers extend to a depth of more than 40 inches. They have hue of 2.5YR through 10YR, value of 3 through 7, and chroma of 4 through 8. The material ranges from fine sandy loam to clay. Mottles with hue of 5YR through 2.5Y, value of 3 through 8, and chroma of 1 through 8 are in some pedons.

Wickham series

The soils of the Wickham series are deep and well drained. They formed in loamy fluvial sediments. Wickham soils are on high stream terraces and side slopes. Slopes range from 0 to 10 percent.

Wickham soils commonly are near Emporia, Slagle, and Peawick soils. The Wickham soils have a redder subsoil than the Emporia soils, are better drained than the Slagle or Peawick soils, and have less clay in the subsoil than the Peawick soils.

Typical pedon of Wickham fine sandy loam, 2 to 6 percent slopes, 2,500 feet north-northeast of the intersection of VA-10 and VA-639, 300 feet west of VA-639:

Ap—0 to 9 inches; yellowish brown (10YR 5/4) fine sandy loam; weak medium granular structure; very friable, nonsticky, nonplastic; common fine roots; common medium pores; many fine and medium krotovinas; strongly acid; clear smooth boundary.

B1—9 to 18 inches; strong brown (7.5YR 5/6) loam; weak medium subangular blocky structure; very friable, slightly sticky; common fine roots, common medium pores; many fine and medium krotovinas; few fine flakes of mica; strongly acid; clear smooth boundary.

B21t—18 to 24 inches; yellowish red (5YR 5/6) sandy clay loam; moderate medium subangular blocky structure; friable, sticky, slightly plastic; few fine roots; common medium pores; thin patchy clay films on faces of peds; common fine and medium krotovinas; common fine flakes of mica; very strongly acid; clear smooth boundary.

B22t—24 to 41 inches; yellowish red (5YR 5/8) clay loam; moderate medium subangular blocky structure; friable, sticky, plastic; common medium pores; common thin patchy clay films on faces of peds; common fine and medium krotovinas; common fine flakes of mica; very strongly acid; clear smooth boundary.

B3t—41 to 62 inches; yellowish red (5YR 5/8) sandy loam; common medium distinct brownish yellow (10YR 6/6) mottles; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; thin patchy clay films on faces of peds; common fine and medium krotovinas; very strongly acid; gradual wavy boundary.

C—62 to 88 inches; yellowish brown (10YR 5/6) sandy loam; common medium distinct pale brown (10YR 6/3) and light yellowish brown (10YR 6/4) mottles; massive; friable, slightly sticky, slightly plastic; common fine flakes of mica; very strongly acid.

The solum thickness is more than 48 inches. The soil ranges from very strongly acid through medium acid unless limed. Quartz pebbles 1/4 inch to 1-1/2 inches in diameter make up 0 to 5 percent of the A horizon and 0 to 10 percent of the B and C horizons.

The A horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 through 4. It is fine sandy loam or loam.

The B1 horizon has hue of 7.5YR, value of 5 or 6, and chroma of 4 through 6. It is fine sandy loam or loam.

The B2t horizon has hue of 2.5YR or 5YR, value of 4 through 6, and chroma of 4 through 8. It is sandy clay loam or clay loam.

The B3t horizon has hue of 5YR through 10YR, value of 4 through 6, and chroma of 6 or 8. It commonly has bright mottles. It is sandy loam or clay loam.

The C horizon has hue of 5YR through 10YR, value of 5 or 6, and chroma of 3 through 6. It is loamy sand, sandy loam, or sandy clay loam.

formation of the soils

Soil is formed by weathering and other processes that act upon parent material. The characteristics of a soil depend upon the interaction of parent material, climate, plants and animals, relief, and time.

Climate and plants and animals are the active forces of soil formation. They act on the parent material that has accumulated through the deposition of sediments and slowly change it into soil. Although all five factors affect the formation of every soil, the relative importance of each differs from place to place. In extreme cases one factor may dominate in the formation of a soil and fix most of its properties. In general, however, it is the combined action of the five factors that determines the character of each soil.

parent material

The unconsolidated mass from which a soil formed is parent material. It is largely responsible for the chemical and mineralogical composition of the soil and the rate at which soil-forming processes take place.

All parent material in Prince George County is alluvial and has been transported and deposited by marine or fluvial action. Deposition has occurred over different periods of geologic time and has given rise to four somewhat distinct areas of soils in the county. The first and oldest area is generally at an elevation of more than about 90 feet and is dominated by soils that formed from sediments of marine or fluviomarine origin. Some examples are loamy Slagle soils, silty Montross soils, and clayey Ackwater soils. The second area is generally between elevations of 25 and 90 feet and is dominated by loamy and clayey soils that formed from sediments of fluviomarine origin. The third area consists of soils below an elevation of about 25 feet that formed in fluvial sediments deposited from the James and Appomattox Rivers. Examples are the Pamunkey and Bolling soils. The fourth group of soils in the county consists of those along the major drainageways and swamps that are continuously receiving sediments eroded from surrounding uplands. Examples are the Kinston and Muckalee soils. These soils have a wide range in texture and have little development.

climate

As a genetic factor, climate affects the physical, chemical, and biological relationships in soils, principally through the influence of precipitation and temperature. Water dissolves minerals, supports biological activity, and transports mineral and organic residue through the soil. Temperature determines the types of physical, chemical, and biological activities that take place and the speed at which they act.

Because precipitation in Prince George County exceeds evapotranspiration, the soils are leached. Much of the soluble materials that originally were present or were released through weathering have been removed. However, soluble materials have not been removed from alluvial areas which are recharged with eroded sediments, such as areas of Kinston and Muckalee soils. Precipitation is mainly responsible for formation of the subsoil that characterizes most soils in the county. In addition to leaching soluble materials, water that percolates through the soil moves clay from the surface layer to a subsoil layer. Except for the soils formed in recent alluvium or sand or on very steep slopes, the soils of the county typically have more clay in the subsoil than in the surface layer.

Also influenced by climate is the formation of blocky structure in the subsoil of well developed soils. The development of peds (aggregates) in the subsoil is caused partly by changes in volume of the soil mass that are primarily the result of alternate wetting and drying.

plant and animal life

Micro-organisms, vegetation, animals, and man are major factors in the formation of soils. Vegetation is generally responsible for the amount of organic matter, the color of the surface layer, and the amount of nutrients. Earthworms, cicada, and burrowing animals help to keep the soil open and porous. Micro-organisms decompose the vegetation and dead animal matter, thus releasing nutrients for plant food.

Before settlement by man, the native vegetation in the county was the major living organism affecting soil development. The native vegetation consisted mainly of pines and hardwoods. Most hardwoods use a large amount of the available calcium and other bases and constantly recycle them through leaf fall and decay. This characteristic of the hardwoods has prevented the soils of Prince George County from becoming as leached as they would have been under a coniferous forest cover. Also, since the soils formed under forest vegetation,

rapid decay of organic matter and constant recycling of nutrients have prevented organic matter accumulation in large quantities. In addition, the climate favors rapid decay of plant materials, oxidation of organic matter, and leaching of nutrients.

As farming developed in the county, man became an important factor in the development of the soils. The clearing of the forests, land cultivation, introduction of new plants, and changes in natural drainage all have had an effect on soil development. The most important changes brought about by man are the mixing of the upper layers of the soil to form a plow layer; cultivating strongly sloping soils, resulting in accelerated erosion; and liming and fertilizing to change the content of plant nutrients, especially in the upper layers.

relief

The underlying geologic formations, the geologic history of the general region, and the effects of dissection by rivers and streams largely determine the relief of an area. Relief influences soil formation through its effects on moisture relationships, erosion, temperature, and plant cover.

Prince George County lies entirely within the Coastal Plain province. Most of the survey area is on the Sunderland terrace plain, which ranges in elevation from about 90 to 175 feet above sea level. This section has been slightly dissected by streams. The Wicomico terrace plain, generally between elevations of about 70 and 90 feet, and the Chowan terrace, generally at an elevation of about 25 to 70 feet, are not clearly separated in the county. The section between 25 and 90 feet has been highly dissected by streams and drains in some areas. The Dismal Swamp terrace consists of the areas generally below an elevation of 25 feet and is only slightly dissected.

Most upland areas in the county are well drained. However, where natural stream dissection has not created drainage outlets in upland areas, moderately well drained to poorly drained soils have formed. In most instances the parent materials and other soil-forming factors are essentially the same and relief, or topography, has modified the effects of the other soil forming factors. For example, Emporia and Slagle soils have formed from similar parent materials, yet the Emporia soils are slightly higher on the landscape and are well drained, while the adjacent Slagle soils are moderately well drained.

Drainage is also commonly related to the texture and position of the alluvium as well as to the relief. Thus, on the lower terrace, poorly drained Argent soils have formed in fine-textured slackwater deposits, while well drained Pamunkey soils have formed in coarse-textured deposits that are generally adjacent to the rivers and streams.

time

As a factor of soil formation, time generally is related to the degree of development or degree of horizon differentiation within the soil. A soil that has little or no horizon development is considered a young soil, and one that has strongly developed horizons is considered an old, or mature, soil.

The oldest soils in Prince George County are those formed on well drained uplands at higher elevations. These older soils, such as Norfolk and Emporia soils, have a strong degree of horizon differentiation. Soils such as Kinston and Muckalee soils formed in recent alluvium have been in place only a relatively short time and show little or no horizon development. They are commonly stratified and have an irregular distribution of organic matter in the profile.

processes of soil horizon differentiation

Most soils have three major horizons, called A, B, and C horizons. These major horizons may be further subdivided by the use of numbers and letters to indicate changes within one horizon. An example would be the B2t horizon, a B horizon that has an accumulation of clay.

The A horizon is the surface layer. An A1 horizon is that part of the surface layer that has the largest accumulation of organic matter. The A horizon is also the layer of maximum leaching and eluviation of clay and iron. If considerable leaching has taken place and organic matter has not darkened the material, this horizon is called an A2 horizon.

The B horizon underlies the A horizon and is commonly called the subsoil. It is the horizon of maximum accumulation, or illuviation, of clay, iron, aluminum, or other compounds leached from the surface layer. In some soils the B horizon has been formed by alteration in place rather than by illuviation. The alteration can be caused by oxidation and reduction of iron or by the weathering of clay minerals. The B horizon commonly has blocky or prismatic structure, and it generally is firmer and lighter in color than the A1 horizon but darker in color than the C horizon.

The C horizon is below the B horizon or, in some cases, below the A horizon. It consists of materials that are little altered by the soil-forming processes, but it can be modified by weathering.

In Prince George County several processes are involved in the formation of soil horizons. Among these are the accumulation of organic matter, the leaching of soluble salts, the reduction and transfer of iron, the formation of soil structure, and the formation and translocation of clay minerals. These processes are continually taking place and generally at the same time

throughout the profile. Such processes have been going on for thousands of years.

The accumulation and incorporation of organic matter take place with the decomposition of plant residue, which darkens the surface layer and helps to form the A1 horizon. In many places, much of the surface layer has been eroded or, through cultivation, has been mixed with materials from underlying layers. Organic matter, once lost, normally takes a long time to replace. In Prince George County the organic matter content of the surface layer varies from low in such sandy soils such as Catpoint soils to high in fine-textured, marshy soils such as Levy soils. A low to medium amount of organic matter is dominant for most soils in the county.

For soils to have distinct subsoil horizons, it is believed that some of the lime and soluble salts must be leached prior to the translocation of clay minerals. Among the factors that affect this leaching are the kinds of salts originally present, the depth to which the soil solution percolates, and the texture of the soil.

Well drained and moderately well drained soils in Prince George County typically have a yellowish brown to yellowish red subsoil. These colors are caused mainly by thin coatings of iron oxides on sand and silt grains, although in some soils the colors are inherited from the materials in which the soils formed.

A fragipan has developed in the subsoil of one moderately well drained soil in the county. The Burrowsville soil has a horizon that is very firm and brittle when moist and very hard when dry. Soil particles are tightly packed so that bulk density is high and pore space is low. Genesis of this horizon is not fully understood, but studies show that swelling and shrinking take place in alternating wet and dry periods. This may account for the packing of soil particles and for a gross polygonal pattern of cracks in the fragipan. Clay, silica, and oxides of aluminum are the likely cementing agents causing brittleness and hardness.

The reduction and transfer of iron is associated mainly with the wetter, more poorly drained soils. This process is called gleying. Moderately well drained to somewhat poorly drained soils, such as Slagle and Lynchburg soils, have yellowish brown and strong brown mottles, which indicate the segregation of iron. In poorly drained soils, such as Rains and Argent soils, the subsoil and underlying materials are grayish, which indicates reduction and transfer of iron by removal in solution.

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glossary

ABC soil. A soil having an A, a B, and a C horizon.

AC soil. A soil having only an A and a C horizon. Commonly such soil formed in recent alluvium or on steep rocky slopes.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Base saturation. The degree to which material having cation exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation exchange capacity.

Bedding planes. Fine stratifications, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediments.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bottom land. The normal flood plain of a stream, subject to flooding.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Conservation tillage system. A form of noninversion tillage that retains protective amounts of residue mulch on the surface of the soil throughout the year.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.
Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.
Soft.—When dry, breaks into powder or individual grains under very slight pressure.
Cemented.—Hard; little affected by moistening.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Deferred grazing. Postponing grazing or resting grazingland for a prescribed period.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:
Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.
Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.
Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.
Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.
Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.
Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.
Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.
Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.
Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a

catastrophe in nature, for example, fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay in the soil. The soil is not a source of gravel or sand for construction purposes.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity*.

Fine textured soil. Sandy clay, silty clay, and clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Graded stripcropping. Growing crops in strips that grade toward a protected waterway.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.5 centimeters) in diameter.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an upper case letter represents the major horizons. Numbers or lower case letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual*. The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is in part a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the Arabic numeral 2 precedes the letter C.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake in inches per hour is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Large stones (in tables). Rock fragments 3 inches (7.5 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Sandy loam and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan.*

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Rippable. Bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 draw bar horsepower rating.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to insure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.5 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millimeters
Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Breaking up a compact subsoil by pulling a special chisel through the soil.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Data were recorded in the period 1951-78 at Hopewell, Virginia]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days[1]	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January----	50.2	29.2	39.7	75	4	30	3.35	1.85	4.66	7	4.6
February---	52.9	31.2	42.0	76	10	21	3.23	1.92	4.40	7	1.8
March------	61.8	38.0	49.9	86	20	132	3.62	2.46	4.67	8	1.2
April------	73.4	46.9	60.2	92	28	310	3.07	1.71	4.26	6	.0
May--------	80.3	55.9	68.1	94	36	561	3.81	2.28	5.18	7	.0
June-------	86.7	63.7	75.9	98	47	756	3.61	2.15	4.90	7	.0
July-------	89.8	68.2	79.0	99	55	899	5.07	2.85	7.02	8	.0
August-----	88.6	67.7	78.1	99	53	871	4.71	2.63	6.54	7	.0
September--	82.8	60.8	71.8	95	42	654	3.92	1.84	5.71	6	.0
October----	72.9	49.3	61.1	89	28	349	3.61	1.20	5.58	5	.0
November---	63.3	39.6	51.5	83	19	103	2.99	1.42	4.34	6	.1
December---	52.9	32.3	42.6	76	11	49	3.55	1.92	4.99	7	1.1
Yearly:											
Average--	71.3	48.6	59.9	---	---	---	---	---	---	---	---
Extreme--	---	---	---	100	4	---	---	---	---	---	---
Total----	---	---	---	---	---	4,735	44.54	37.30	51.44	81	8.8

[1] A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50° F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Data were recorded in the period 1951-78 at Hopewell, Virginia]

Probability	Temperature		
	24° F or lower	28° F or lower	32° F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	March 30	April 5	April 24
2 years in 10 later than--	March 23	March 31	April 19
5 years in 10 later than--	March 9	March 22	April 10
First freezing temperature in fall:			
1 year in 10 earlier than--	November 5	October 26	October 19
2 years in 10 earlier than--	November 11	October 30	October 23
5 years in 10 earlier than--	November 22	November 6	October 30

TABLE 3.--GROWING SEASON

[Data were recorded in the period 1951-78 at Hopewell, Virginia]

Probability	Daily minimum temperature during growing season		
	Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
9 years in 10	234	210	186
8 years in 10	242	216	192
5 years in 10	257	228	203
2 years in 10	271	240	214
1 year in 10	279	247	220

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
1A	Ackwater silt loam, 0 to 2 percent slopes	543	0.3
1B	Ackwater silt loam, 2 to 6 percent slopes	10,288	5.4
1C	Ackwater silt loam, 6 to 10 percent slopes	5,565	2.9
2C3	Ackwater silty clay loam, 6 to 10 percent slopes, severely eroded	4,913	2.6
2D3	Ackwater silty clay loam, 10 to 25 percent slopes, severely eroded	823	0.4
3	Argent silt loam	2,238	1.2
4A	Aycock silt loam, 0 to 2 percent slopes	4,678	2.5
4B	Aycock silt loam, 2 to 6 percent slopes	3,387	1.8
5	Bojac loamy sand	442	0.2
6	Bolling silt loam	1,056	0.6
7B	Bonneau loamy sand, 0 to 6 percent slopes	4,960	2.6
7C	Bonneau loamy sand, 6 to 10 percent slopes	594	0.3
8A	Burrowsville sandy loam, 0 to 2 percent slopes	349	0.2
8B	Burrowsville sandy loam, 2 to 6 percent slopes	1,429	0.8
9	Catpoint fine sand	610	0.3
10	Chickahominy silt loam	1,938	1.0
11B	Emporia fine sandy loam, 2 to 6 percent slopes	18,401	9.7
11C	Emporia fine sandy loam, 6 to 10 percent slopes	4,043	2.1
12F	Emporia soils, 15 to 45 percent slopes	10,877	5.8
13D	Emporia and Slagle soils, 6 to 15 percent slopes	5,510	2.9
14	Kinston complex	15,434	8.2
15	Levy silt loam	1,064	0.6
16	Lynchburg loam	2,517	1.3
17	Lynchburg-Slagle complex	2,545	1.3
18A	Montross silt loam, 0 to 2 percent slopes	12,721	6.7
18B	Montross silt loam, 2 to 6 percent slopes	1,344	0.7
19	Muckalee loam	1,189	0.6
20	Newflat silt loam	2,606	1.4
21	Norfolk fine sandy loam	3,808	2.0
22A	Pamunkey loam, 0 to 2 percent slopes	1,886	1.0
22B	Pamunkey loam, 2 to 6 percent slopes	1,717	0.9
23A	Peawick silt loam, 0 to 2 percent slopes	6,070	3.2
23B	Peawick silt loam, 2 to 6 percent slopes	3,361	1.8
23C	Peawick silt loam, 6 to 10 percent slopes	1,546	0.8
24	Rains loam	2,805	1.5
25A	Slagle sandy loam, 0 to 2 percent slopes	5,588	3.0
25B	Slagle sandy loam, 2 to 6 percent slopes	16,699	8.8
25C	Slagle sandy loam, 6 to 10 percent slopes	4,686	2.5
26	Udorthents, loamy	1,811	1.0
27	Udorthents, clayey	674	0.4
28	Urban land	1,454	0.8
29	Urban land-Udorthents complex	1,033	0.5
30A	Wickham fine sandy loam, 0 to 2 percent slopes	1,146	0.6
30B	Wickham fine sandy loam, 2 to 6 percent slopes	2,482	1.3
30C	Wickham fine sandy loam, 6 to 10 percent slopes	912	0.5
	Water	9,250	5.0
	Total	188,992	100.0

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE

[Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil]

Soil name and map symbol	Corn	Soybeans	Peanuts	Wheat	Barley	Tobacco	Tall fescue
	Bu	Bu	Lb	Bu	Bu	Lb	AUM*
1A----------------------- Ackwater	90	30	---	30	40	---	7.0
1B----------------------- Ackwater	80	25	---	30	40	---	6.5
1C----------------------- Ackwater	60	20	---	25	35	---	5.0
2C3---------------------- Ackwater	---	---	---	---	---	---	3.0
2D3---------------------- Ackwater	---	---	---	---	---	---	---
3------------------------ Argent	110	45	---	45	60	---	6.0
4A----------------------- Aycock	130	45	2,600	60	70	2,800	7.0
4B----------------------- Aycock	120	40	2,800	60	70	2,700	6.5
5------------------------ Bojac	90	35	4,000	40	60	1,800	6.0
6------------------------ Bolling	120	40	---	60	70	---	7.0
7B----------------------- Bonneau	85	30	3,000	40	50	2,600	5.0
7C----------------------- Bonneau	80	25	2,200	30	40	2,500	4.5
8A----------------------- Burrowsville	100	30	3,000	35	60	---	5.0
8B----------------------- Burrowsville	100	25	2,800	30	55	---	4.5
9------------------------ Catpoint	60	20	---	20	40	---	7.5
10----------------------- Chickahominy	90	30	---	40	60	---	5.8
11B---------------------- Emporia	110	30	3,800	50	60	2,900	8.5
11C---------------------- Emporia	90	25	2,800	45	50	2,700	8.0
12F---------------------- Emporia	---	---	---	---	---	---	---
13D---------------------- Emporia and Slagle	70	20	---	25	30	---	6.5
14----------------------- Kinston	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Soybeans	Peanuts	Wheat	Barley	Tobacco	Tall fescue
	Bu	Bu	Lb	Bu	Bu	Lb	AUM*
15: Levy	---	---	---	---	---	---	---
16: Lynchburg	110	45	---	50	70	---	10.0
17: Lynchburg-Slagle	115	40	---	45	70	2,400	9.5
18A: Montross	120	30	3,000	30	50	---	8.5
18B: Montross	115	25	3,000	25	45	---	7.5
19: Muckalee	---	---	---	---	---	---	---
20: Newflat	95	30	---	40	60	---	7.0
21: Norfolk	115	40	4,000	60	70	3,000	9.5
22A: Pamunkey	130	45	4,200	75	80	---	9.0
22B: Pamunkey	125	40	4,000	75	80	---	9.0
23A: Peawick	90	28	---	30	40	---	8.5
23B: Peawick	80	24	---	30	40	---	8.0
23C: Peawick	60	20	---	25	35	---	5.0
24: Rains	100	40	---	45	75	---	9.0
25A: Slagle	125	40	3,500	45	70	2,800	9.0
25B: Slagle	115	35	3,500	40	60	2,800	8.5
25C: Slagle	100	30	2,800	35	55	2,400	8.0
26**, 27**. Udorthents							
28**. Urban land							
29: Urban land-Udorthents	---	---	---	---	---	---	---
30A: Wickham	120	40	3,400	50	70	2,800	9.5
30B: Wickham	115	35	3,300	45	65	2,600	9.0
30C: Wickham	105	25	2,800	35	30	---	8.0

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available]

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Trees to plant
1A, 1B: Ackwater	3w	Slight	Moderate	Slight	Slight	Loblolly pine	77	Loblolly pine, sweetgum.
						Southern red oak	70	
						White oak	70	
						Sweetgum	77	
1C: Ackwater	3r	Moderate	Moderate	Slight	Slight	Loblolly pine	77	Loblolly pine, sweetgum.
						Southern red oak	70	
						White oak	70	
						Sweetgum	77	
2C3: Ackwater	3c	Slight	Moderate	Slight	Moderate	Loblolly pine	77	Loblolly pine, sweetgum.
						Southern red oak	70	
						White oak	70	
						Sweetgum	77	
2D3: Ackwater	3r	Moderate	Severe	Slight	Moderate	Loblolly pine	77	Loblolly pine, sweetgum.
						Southern red oak	70	
						White oak	70	
						Sweetgum	77	
3: Argent	1w	Slight	Severe	Moderate	Slight	Loblolly pine	96	Loblolly pine, sweetgum, American sycamore.
						Sweetgum	96	
						Water oak	86	
4A, 4B: Aycock	2o	Slight	Slight	Slight	Slight	Hickory	---	Loblolly pine.
						Loblolly pine	89	
						White oak	---	
						Southern red oak	80	
						Yellow-poplar	75	
5: Bojac	3o	Slight	Slight	Slight	Slight	Southern red oak	70	Loblolly pine.
						Virginia pine	75	
						Loblolly pine	80	
6: Bolling	2w	Slight	Moderate	Slight	Slight	Virginia pine	80	Loblolly pine, yellow-poplar, black walnut.
						Loblolly pine	90	
						Yellow-poplar	90	
7B, 7C: Bonneau	2s	Slight	Moderate	Moderate	Slight	Loblolly pine	95	Loblolly pine, longleaf pine.
						Hickory	---	
						White Oak	80	
8A, 8B: Burrowsville	3o	Slight	Slight	Slight	Slight	Loblolly pine	76	Loblolly pine.
						Virginia pine	70	
						Southern red oak	66	
						White oak	66	
						Hickory	---	
9: Catpoint	3s	Slight	Moderate	Moderate	Slight	Loblolly pine	76	Loblolly pine.
						Sweetgum	80	
						Water oak	70	
10: Chickahominy	2w	Slight	Severe	Severe	Moderate	Loblolly pine	88	Loblolly pine, sweetgum.
						Sweetgum	95	
						Water oak	---	
						Willow oak	---	
						Red maple	---	

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Trees to plant
11B, 11C----------- Emporia	3o	Slight	Slight	Slight	Slight	Loblolly pine-------	76	Loblolly pine, sweetgum.
						Southern red oak----	70	
						White oak-----------	---	
						Hickory-------------	---	
						Yellow-poplar-------	80	
12F*--------------- Emporia	3r	Slight	Moderate	Slight	Slight	Loblolly pine-------	76	Loblolly pine, sweetgum.
						Southern red oak----	70	
						Hickory-------------	---	
13D*:								
Emporia-----------	3o	Slight	Slight	Slight	Slight	Loblolly pine-------	76	Loblolly pine, sweetgum.
						Southern red oak----	70	
						Hickory-------------	---	
Slagle------------	2w	Slight	Moderate	Slight	Slight	Loblolly pine-------	86	Loblolly pine, sweetgum, yellow-poplar.
						Sweetgum------------	86	
						Southern red oak----	76	
						Water oak-----------	76	
						Yellow-poplar-------	90	
14*---------------- Kinston	1w	Slight	Severe	Severe	Moderate	Loblolly pine-------	100	Water tupelo, green ash, sweetgum.
						Sweetgum------------	96	
						White oak-----------	90	
						Water tupelo--------	95	
15----------------- Levy	3w	Slight	Severe	Severe	Slight	Water tupelo--------	70	Baldcypress.
						Red maple-----------	70	
						Baldcypress---------	---	
16----------------- Lynchburg	2w	Slight	Moderate	Slight	Slight	Loblolly pine-------	86	Loblolly pine, American sycamore, sweetgum.
						Yellow-poplar-------	92	
						Sweetgum------------	90	
						Southern red oak----	---	
						White oak-----------	---	
						Blackgum------------	---	
17*:								
Lynchburg---------	2w	Slight	Moderate	Slight	Slight	Loblolly pine-------	86	Loblolly pine, American sycamore, sweet gum.
						Yellow-poplar-------	92	
						Sweetgum------------	90	
						Southern red oak----	---	
						White oak-----------	---	
						Blackgum------------	---	
Slagle------------	2w	Slight	Moderate	Slight	Slight	Loblolly pine-------	86	Loblolly pine, sweetgum, yellow-poplar.
						Sweetgum------------	86	
						Southern red oak----	76	
						Water oak-----------	76	
						Yellow-poplar-------	90	
18A, 18B----------- Montross	3w	Slight	Moderate	Slight	Moderate	Loblolly pine-------	76	Loblolly pine.
						Virginia pine-------	70	
						Southern red oak----	70	
19----------------- Muckalee	2w	Slight	Severe	Severe	Slight	Sweetgum------------	90	Sweetgum, American sycamore.
						Loblolly pine-------	90	
						Water oak-----------	80	
						Green ash-----------	85	
20----------------- Newflat	2w	Slight	Moderate	Moderate	Moderate	Loblolly pine-------	90	Loblolly pine, sweetgum.
						Sweetgum------------	95	
						White oak-----------	---	
						Southern red oak----	---	
						Water oak-----------	---	

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Trees to plant
21------------------ Norfolk	2o	Slight	Slight	Slight	Slight	Loblolly pine--------	86	Loblolly pine.
22A, 22B------------ Pamunkey	2o	Slight	Slight	Slight	Slight	Southern red oak----	80	Loblolly pine, black walnut, yellow-poplar.
						Yellow-poplar--------	90	
						Virginia pine--------	80	
						Loblolly pine--------	---	
23A, 23B------------ Peawick	3w	Slight	Moderate	Slight	Slight	Loblolly pine--------	77	Loblolly pine.
						Sweetgum------------	---	
						Yellow-poplar--------	---	
						Water oak-----------	---	
						White oak-----------	---	
23C----------------- Peawick	3r	Slight	Moderate	Slight	Slight	Loblolly pine--------	77	Loblolly pine.
						Sweetgum------------	---	
						Yellow-poplar--------	---	
						Water oak-----------	---	
						White oak-----------	---	
24------------------ Rains	2w	Slight	Severe	Severe	Moderate	Loblolly pine--------	94	Loblolly pine, sweetgum, American sycamore.
						Sweetgum------------	90	
25A, 25B, 25C------- Slagle	2w	Slight	Moderate	Slight	Slight	Loblolly pine--------	86	Loblolly pine, sweetgum, yellow-poplar.
						Sweetgum------------	86	
						Southern red oak----	76	
						Water oak-----------	76	
						Yellow-poplar--------	90	
30A, 30B, 30C------- Wickham	2o	Slight	Slight	Slight	Slight	Loblolly pine--------	90	Loblolly pine, yellow-poplar.
						Yellow-poplar--------	100	
						Southern red oak----	---	
						Hickory--------------	---	

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
1A, 1B----------------- Ackwater	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Moderate: wetness.	Moderate: wetness.
1C, 2C3---------------- Ackwater	Severe: percs slowly.	Severe: percs slowly.	Severe: slope, percs slowly.	Severe: erodes easily.	Moderate: wetness, slope.
2D3-------------------- Ackwater	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Severe: erodes easily.	Severe: slope.
3---------------------- Argent	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
4A--------------------- Aycock	Slight----------	Slight----------	Slight----------	Slight------------	Slight.
4B--------------------- Aycock	Slight----------	Slight----------	Moderate: slope.	Slight------------	Slight.
5---------------------- Bojac	Slight----------	Slight----------	Slight----------	Slight------------	Moderate: droughty.
6---------------------- Bolling	Severe: flooding.	Moderate: wetness.	Moderate: flooding, wetness.	Moderate: wetness.	Moderate: wetness, flooding.
7B--------------------- Bonneau	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Moderate: droughty.
7C--------------------- Bonneau	Moderate: slope, too sandy.	Moderate: slope, too sandy.	Severe: slope.	Moderate: too sandy.	Moderate: droughty, slope.
8A--------------------- Burrowsville	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
8B--------------------- Burrowsville	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness.	Moderate: wetness.	Moderate: wetness.
9---------------------- Catpoint	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
10--------------------- Chickahominy	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.
11B-------------------- Emporia	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight------------	Slight.
11C-------------------- Emporia	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight------------	Moderate: slope.
12F*------------------- Emporia	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
13D*:					
Emporia	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight	Moderate: slope.
Slagle	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Moderate: wetness.	Moderate: wetness, slope.
14* Kinston	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
15 Levy	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding, flooding.	Severe: ponding.	Severe: ponding, flooding.
16 Lynchburg	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
17*:					
Lynchburg	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Slagle	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
18A Montross	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
18B Montross	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness.	Moderate: wetness.	Moderate: wetness.
19 Muckalee	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
20 Newflat	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.
21 Norfolk	Slight	Slight	Slight	Slight	Slight.
22A Pamunkey	Slight	Slight	Slight	Slight	Slight.
22B Pamunkey	Slight	Slight	Moderate: slope.	Slight	Slight.
23A, 23B Peawick	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Moderate: wetness.	Moderate: wetness.
23C Peawick	Severe: percs slowly.	Severe: percs slowly.	Severe: slope, percs slowly.	Severe: erodes easily.	Moderate: wetness, slope.
24 Rains	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
25A Slagle	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
25B Slagle	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness.	Moderate: wetness.	Moderate: wetness.
25C Slagle	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Moderate: wetness.	Moderate: wetness, slope.
26*, 27*. Udorthents					
28*. Urban land					
29*: Urban land.					
Udorthents.					
30A Wickham	Slight	Slight	Slight	Slight	Slight.
30B Wickham	Slight	Slight	Moderate: slope.	Slight	Slight.
30C Wickham	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--WILDLIFE HABITAT

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hardwood trees	Conif- erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
1A, 1B------------- Ackwater	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
1C----------------- Ackwater	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
2C3---------------- Ackwater	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
2D3---------------- Ackwater	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
3------------------ Argent	Fair	Fair	Good	Good	Good	Good	Good	Fair	Good	Good.
4A, 4B------------- Aycock	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
5------------------ Bojac	Poor	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
6------------------ Bolling	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
7B, 7C------------- Bonneau	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
8A----------------- Burrowsville	Fair	Good	Good	Fair	Fair	Poor	Poor	Good	Fair	Poor.
8B----------------- Burrowsville	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
9------------------ Catpoint	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
10----------------- Chickahominy	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good
11B---------------- Emporia	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
11C---------------- Emporia	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
12F*--------------- Emporia	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
13D*: Emporia-----------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Slagle------------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
14*---------------- Kinston	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
15----------------- Levy	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.

See footnote at end of table.

TABLE 8.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hardwood trees	Conif-erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
16----------------- Lynchburg	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
17*:										
Lynchburg---------	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Slagle------------	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
18A---------------- Montross	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
18B---------------- Montross	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
19----------------- Muckalee	Poor	Poor	Fair	Fair	Fair	Good	Fair	Poor	Fair	Good.
20----------------- Newflat	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
21----------------- Norfolk	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
22A, 22B----------- Pamunkey	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
23A, 23B----------- Peawick	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
23C---------------- Peawick	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
24----------------- Rains	Fair	Fair	Fair	Good	Good	Good	Good	Fair	Good	Good.
25A---------------- Slagle	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
25B---------------- Slagle	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
25C---------------- Slagle	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
26*, 27*. Udorthents										
28*. Urban land										
29*:										
Urban land.										
Udorthents.										
30A---------------- Wickham	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
30B---------------- Wickham	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
30C---------------- Wickham	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
1A, 1B Ackwater	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Moderate: wetness.
1C, 2C3 Ackwater	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: wetness, slope.
2D3 Ackwater	Severe: wetness, slope.	Severe: shrink-swell, slope.	Severe: wetness, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
3 Argent	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness.	Severe: wetness.
4A Aycock	Moderate: wetness.	Slight	Moderate: wetness.	Slight	Moderate: low strength.	Slight.
4B Aycock	Moderate: wetness.	Slight	Moderate: wetness.	Moderate: slope.	Moderate: low strength.	Slight.
5 Bojac	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Slight	Moderate: droughty.
6 Bolling	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Moderate: wetness, flooding.
7B Bonneau	Moderate: wetness.	Slight	Moderate: wetness.	Slight	Slight	Moderate: droughty.
7C Bonneau	Moderate: wetness, slope.	Moderate: slope.	Moderate: wetness, slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope.
8A, 8B Burrowsville	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Moderate: wetness.	Moderate: wetness.
9 Catpoint	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Slight	Severe: droughty.
10 Chickahominy	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: low strength, wetness, shrink-swell.	Severe: wetness.
11B Emporia	Moderate: wetness.	Slight	Moderate: wetness, shrink-swell.	Moderate: slope.	Moderate: low strength.	Slight.
11C Emporia	Moderate: slope, wetness.	Moderate: slope.	Moderate: wetness, slope, shrink-swell.	Severe: slope.	Moderate: slope, low strength.	Moderate: slope.
12F* Emporia	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
13D*:						
Emporia----------	Moderate: slope, wetness.	Moderate: slope.	Moderate: wetness, slope, shrink-swell.	Severe: slope.	Moderate: slope, low strength.	Moderate: slope.
Slagle-----------	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: wetness.	Severe: slope.	Severe: low strength.	Moderate: wetness, slope.
14*--------------- Kinston	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.
15---------------- Levy	Severe: ponding.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding, shrink-swell.	Severe: low strength, ponding, flooding.	Severe: ponding, flooding.
16---------------- Lynchburg	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
17*:						
Lynchburg--------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Slagle-----------	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: low strength.	Moderate: wetness.
18A, 18B---------- Montross	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: low strength.	Moderate: wetness.
19---------------- Muckalee	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.
20---------------- Newflat	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: low strength, wetness, shrink-swell.	Severe: wetness.
21---------------- Norfolk	Moderate: wetness.	Slight---------	Moderate: wetness.	Slight---------	Slight---------	Slight.
22A--------------- Pamunkey	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Moderate: low strength.	Slight.
22B--------------- Pamunkey	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Moderate: low strength.	Slight.
23A, 23B---------- Peawick	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Moderate: wetness.
23C--------------- Peawick	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: wetness, slope.
24---------------- Rains	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
25A--------------- Slagle	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: low strength.	Moderate: wetness.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
25B: Slagle	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: low strength.	Moderate: wetness.
25C: Slagle	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: wetness.	Severe: slope.	Severe: low strength.	Moderate: wetness, slope.
26*, 27*. Udorthents						
28*. Urban land						
29*:						
Urban land.						
Udorthents.						
30A: Wickham	Slight	Slight	Slight	Slight	Slight	Slight.
30B: Wickham	Slight	Slight	Slight	Moderate: slope.	Slight	Slight.
30C: Wickham	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
1A, 1B: Ackwater	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
1C, 2C3: Ackwater	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: wetness, too clayey.	Moderate: wetness, slope.	Poor: too clayey, hard to pack.
2D3: Ackwater	Severe: wetness, percs slowly, slope.	Severe: slope, wetness.	Severe: wetness, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
3: Argent	Severe: percs slowly, wetness.	Severe: wetness.	Severe: too clayey, wetness.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
4A: Aycock	Moderate: wetness, percs slowly.	Moderate: seepage, wetness.	Moderate: too clayey.	Slight	Fair: too clayey.
4B: Aycock	Moderate: wetness, percs slowly.	Moderate: seepage, slope, wetness.	Moderate: too clayey.	Slight	Fair: too clayey.
5: Bojac	Moderate: wetness.	Severe: seepage.	Severe: wetness, seepage.	Severe: seepage.	Fair: thin layer.
6: Bolling	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness, too clayey.	Severe: flooding, seepage, wetness.	Poor: too clayey, hard to pack.
7B: Bonneau	Moderate: wetness.	Severe: seepage.	Severe: wetness.	Moderate: wetness.	Good.
7C: Bonneau	Moderate: wetness, slope.	Severe: seepage, slope.	Severe: wetness.	Moderate: wetness, slope.	Fair: slope.
8A, 8B: Burrowsville	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: wetness.	Severe: seepage.	Fair: wetness.
9: Catpoint	Severe: poor filter.	Severe: seepage.	Severe: seepage, wetness, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
10: Chickahominy	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
11B: Emporia	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Moderate: wetness, too clayey.	Slight	Fair: too clayey, wetness.
11C: Emporia	Severe: wetness, percs slowly.	Severe: seepage, slope, wetness.	Moderate: slope, wetness, too clayey.	Moderate: slope.	Fair: slope, too clayey, wetness.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
12F*: Emporia	Severe: slope, wetness, percs slowly.	Severe: seepage, slope, wetness.	Severe: slope.	Severe: slope.	Poor: slope.
13D*:					
Emporia	Severe: wetness, percs slowly.	Severe: seepage, slope, wetness.	Moderate: slope, wetness, too clayey.	Moderate: slope.	Fair: slope, too clayey, wetness.
Slagle	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: wetness.	Moderate: wetness, slope.	Fair: slope, wetness.
14*: Kinston	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
15: Levy	Severe: flooding, ponding, percs slowly.	Severe: flooding, ponding.	Severe: flooding, ponding, too clayey.	Severe: flooding, ponding.	Poor: too clayey, hard to pack, ponding.
16: Lynchburg	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
17*:					
Lynchburg	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Slagle	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Moderate: wetness.	Fair: wetness.
18A: Montross	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Moderate: wetness.	Poor: too clayey.
18B: Montross	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness, too clayey.	Moderate: wetness.	Poor: too clayey.
19: Muckalee	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
20: Newflat	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
21: Norfolk	Moderate: wetness.	Moderate: seepage.	Slight	Slight	Slight.
22A, 22B: Pamunkey	Slight	Severe: seepage.	Severe: seepage.	Slight	Slight.
23A, 23B: Peawick	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
23C: Peawick	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: wetness, too clayey.	Moderate: wetness, slope.	Poor: too clayey, hard to pack.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
24------------------- Rains	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
25A, 25B------------- Slagle	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Moderate: wetness.	Fair: wetness.
25C------------------ Slagle	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: wetness.	Moderate: wetness, slope.	Fair: slope, wetness.
26*, 27*. Udorthents					
28*. Urban land					
29*: Urban land.					
Udorthents.					
30A------------------ Wickham	Slight--------------	Moderate: seepage.	Severe: seepage.	Slight--------------	Fair: thin layer.
30B------------------ Wickham	Slight--------------	Moderate: seepage, slope.	Severe: seepage.	Slight--------------	Fair: thin layer.
30C------------------ Wickham	Moderate: slope.	Severe: slope.	Severe: seepage.	Moderate: slope.	Fair: slope, thin layer.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," "poor," "probable," and "improbable." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
1A, 1B, 1C, 2C3: Ackwater	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
2D3: Ackwater	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
3: Argent	Poor: wetness, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, thin layer.
4A, 4B: Aycock	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
5: Bojac	Good	Probable	Improbable: too sandy.	Fair: too sandy.
6: Bolling	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.
7B: Bonneau	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy.
7C: Bonneau	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy, slope.
8A, 8B: Burrowsville	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones, thin layer.
9: Catpoint	Good	Probable	Improbable	Poor: too sandy, area reclaim.
10: Chickahominy	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
11B: Emporia	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Good.
11C: Emporia	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
12F*: Emporia	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
13D*:				
Emporia	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
Slagle	Fair: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
14*: Kinston	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
15: Levy	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
16: Lynchburg	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
17*:				
Lynchburg	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Slagle	Fair: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Good.
18A, 18B: Montross	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, thin layer.
19: Muckalee	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
20: Newflat	Severe: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
21: Norfolk	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
22A, 22B: Pamunkey	Good	Improbable: thin layer.	Improbable: thin layer, too sandy.	Good.
23A, 23B, 23C: Peawick	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
24: Rains	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
25A, 25B: Slagle	Fair: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Good.
25C: Slagle	Fair: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
26*, 27*. Udorthents				
28*. Urban land				
29*:				
Urban land.				
Udorthents.				
30A, 30B: Wickham	Fair: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Good.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
30C-------------------- Wickham	Fair: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated]

Soil name and map symbol	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Limitations for-- Aquifer-fed excavated ponds	Features affecting-- Drainage	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
1A Ackwater	Slight	Severe: hard to pack.	Severe: no water.	Percs slowly	Erodes easily, wetness, percs slowly.	Erodes easily, percs slowly.
1B Ackwater	Moderate: slope.	Severe: hard to pack.	Severe: no water.	Percs slowly, slope.	Erodes easily, wetness, percs slowly.	Erodes easily, percs slowly.
1C, 2C3, 2D3 Ackwater	Severe: slope.	Severe: hard to pack.	Severe: no water.	Percs slowly, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, percs slowly.
3 Argent	Slight	Severe: wetness, hard to pack.	Severe: slow refill.	Percs slowly	Wetness, percs slowly.	Wetness, percs slowly.
4A, 4B Aycock	Moderate: seepage.	Moderate: piping.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
5 Bojac	Severe: seepage.	Severe: piping.	Severe: cutbanks cave.	Deep to water	Soil blowing	Droughty.
6 Bolling	Moderate: seepage.	Severe: wetness.	Moderate: slow refill.	Flooding	Wetness	Favorable.
7B Bonneau	Moderate: seepage, slope.	Slight	Severe: cutbanks cave.	Deep to water	Soil blowing	Droughty.
7C Bonneau	Severe: slope.	Slight	Severe: cutbanks cave.	Deep to water	Slope, soil blowing.	Slope, droughty.
8A Burrowsville	Severe: seepage.	Severe: thin layer, piping.	Severe: no water.	Percs slowly	Wetness, rooting depth, soil blowing.	Rooting depth, percs slowly.
8B Burrowsville	Severe: seepage.	Severe: thin layer, piping.	Severe: no water.	Percs slowly, slope.	Wetness, rooting depth, soil blowing.	Rooting depth, percs slowly.
9 Catpoint	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Deep to water	Too sandy, soil blowing.	Droughty.
10 Chickahominy	Slight	Severe: hard to pack, wetness.	Severe: slow refill.	Percs slowly	Wetness, percs slowly.	Wetness, percs slowly.
11B Emporia	Moderate: seepage, slope.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Soil blowing	Favorable.
11C, 12F* Emporia	Severe: slope.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope.
13D*:						
Emporia	Severe: slope.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope.
Slagle	Severe: slope.	Moderate: wetness.	Severe: no water.	Slope	Slope, wetness.	Slope.

See footnote at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
14*: Kinston	Moderate: seepage.	Severe: wetness.	Slight	Flooding	Wetness	Wetness.
15: Levy	Slight	Severe: hard to pack, ponding.	Severe: slow refill.	Ponding, percs slowly, flooding.	Ponding, percs slowly.	Wetness, percs slowly.
16: Lynchburg	Moderate: seepage.	Severe: piping, wetness.	Moderate: slow refill.	Favorable	Wetness	Wetness.
17*:						
Lynchburg	Moderate: seepage.	Severe: piping, wetness.	Moderate: slow refill.	Favorable	Wetness	Wetness.
Slagle	Moderate: seepage.	Moderate: wetness.	Severe: no water.	Favorable	Wetness	Favorable.
18A: Montross	Slight	Moderate: piping, wetness.	Severe: no water.	Favorable	Wetness, erodes easily.	Wetness, erodes easily.
18B: Montross	Moderate: slope.	Moderate: piping, wetness.	Severe: no water.	Slope	Wetness, erodes easily.	Wetness, erodes easily.
19: Muckalee	Moderate: seepage.	Severe: piping, wetness.	Severe: cutbanks cave.	Flooding, cutbanks cave.	Wetness	Wetness.
20: Newflat	Slight	Severe: hard to pack, wetness.	Severe: slow refill.	Percs slowly	Wetness, percs slowly.	Wetness, percs slowly.
21: Norfolk	Moderate: seepage.	Slight	Severe: no water.	Deep to water	Favorable	Favorable.
22A, 22B: Pamunkey	Severe: seepage.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Favorable	Favorable.
23A: Peawick	Slight	Severe: hard to pack.	Severe: no water.	Percs slowly	Wetness, percs slowly.	Percs slowly.
23B: Peawick	Moderate: slope.	Severe: hard to pack.	Severe: no water.	Percs slowly, slope.	Wetness, percs slowly.	Percs slowly.
23C: Peawick	Severe: slope.	Severe: hard to pack.	Severe: no water.	Percs slowly, slope.	Slope, wetness, percs slowly.	Slope, percs slowly.
24: Rains	Moderate: seepage.	Severe: piping, wetness.	Moderate: slow refill.	Favorable	Wetness	Wetness.
25A: Slagle	Moderate: seepage.	Moderate: wetness.	Severe: no water.	Favorable	Wetness	Favorable.
25B: Slagle	Moderate: seepage, slope.	Moderate: wetness.	Severe: no water.	Slope	Wetness	Favorable.
25C: Slagle	Severe: slope.	Moderate: wetness.	Severe: no water.	Slope	Slope, wetness.	Slope.
26*, 27*. Udorthents						

See footnote at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
28*. Urban land						
29*: Urban land.						
Udorthents.						
30A, 30B----------- Wickham	Moderate: seepage.	Moderate: thin layer.	Severe: no water.	Deep to water	Favorable------	Favorable.
30C---------------- Wickham	Moderate: seepage.	Moderate: thin layer.	Severe: no water.	Deep to water	Slope-----------	Slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--ENGINEERING INDEX PROPERTIES

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated]

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
1A, 1B, 1C-------- Ackwater	0-5	Silt loam--------	SM, SC, CL-ML	A-4	0	95-100	95-100	65-95	45-90	<25	NP-8
	5-16	Loam, clay loam, silty clay loam.	CL, CH	A-6, A-7	0	95-100	95-100	85-100	65-90	25-55	10-30
	16-72	Silty clay loam, silty clay, clay.	CL, CH	A-7	0	95-100	95-100	85-100	75-95	40-75	15-45
2C3, 2D3---------- Ackwater	0-5	Silty clay loam	CL, CH	A-6, A-7	0	95-100	95-100	90-100	70-90	30-55	12-30
	5-60	Silty clay loam, silty clay, clay.	CL, CH	A-7	0	95-100	95-100	85-100	75-95	40-75	15-45
3---------------- Argent	0-11	Silt loam--------	CL, CL-ML, ML	A-6, A-4	0	100	98-100	90-100	65-95	20-40	3-20
	11-82	Clay, silty clay	CL, CH	A-6, A-7	0	100	98-100	90-100	55-98	30-60	11-40
	82-97	Sandy clay loam, clay loam, silty clay loam.	CL, CL-ML, SC, SM-SC	A-4, A-6, A-7	0	100	98-100	90-100	40-80	22-49	6-28
4A, 4B----------- Aycock	0-25	Silt loam--------	ML, CL-ML, CL	A-4	0	100	95-100	80-100	51-80	<25	NP-10
	25-64	Clay loam, silty clay loam, loam.	CL	A-4, A-6, A-7	0	100	95-100	90-100	60-90	22-49	8-30
5---------------- Bojac	0-9	Loamy sand-------	SM	A-2	0	95-100	95-100	50-100	15-30	<20	NP
	9-36	Fine sandy loam, sandy clay loam, sandy loam.	ML, SM	A-2, A-4	0	95-100	95-100	55-100	20-60	<35	NP-10
	36-64	Stratified loamy fine sand to coarse sand.	SM, SP, SW-SM	A-1, A-2, A-3	0	80-100	75-100	12-100	2-35	<20	NP
6---------------- Bolling	0-12	Silt loam--------	ML, CL, SM, SC	A-4	0	85-100	75-100	60-95	35-85	<30	NP-10
	12-63	Loam, clay loam, silty clay loam.	CL, SC	A-6, A-7	0	95-100	75-100	70-95	40-85	30-45	11-20
7B, 7C----------- Bonneau	0-25	Loamy sand-------	SM	A-2	0	100	100	50-80	15-35	---	NP
	25-80	Sandy loam, sandy clay loam, fine sandy loam.	SC, SM-SC	A-2, A-6, A-4	0	100	100	60-90	30-50	21-37	4-14
8A, 8B----------- Burrowsville	0-14	Sandy loam-------	SM, SM-SC	A-2, A-4	0	85-100	75-100	45-85	30-60	<20	NP-6
	14-25	Sandy loam, fine sandy loam, loam.	SM, SC, SM-SC, CL-ML	A-2, A-4	0	85-100	75-100	60-90	30-65	<22	NP-8
	25-38	Sandy loam, fine sandy loam, loam.	SM, SC, SM-SC, CL-ML	A-4	0	85-100	75-100	60-90	35-65	<22	NP-8
	38-51	Sandy loam, loam, sandy clay loam.	SM, SC, CL	A-4, A-6	0	85-100	75-100	50-95	35-65	<28	NP-15
	51-70	Sandy loam, sandy clay loam.	SM, SC, CL	A-2, A-4, A-6	0	85-100	75-100	50-80	30-55	<22	NP-12
9---------------- Catpoint	0-22	Fine sand--------	SM, SP, SP-SM, SM-SC	A-1, A-2, A-3	0	85-100	75-100	40-70	4-35	<10	NP-5
	22-62	Sand, loamy fine sand, fine sand.	SM, SW, SW-SM, SM-SC	A-1, A-2, A-3	0	65-100	60-100	30-70	4-35	<10	NP-5
	62-84	Fine sand, coarse sand, sand.	SM, SW-SM,	A-1, A-2, A-3	0-2	35-100	45-100	15-65	4-35	<10	NP-5

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification Unified	Classification AASHTO	Frag-ments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
10---------------- Chickahominy	0-7	Silt loam---------	SM, SC, CL-ML	A-4	0	95-100	90-100	75-95	45-90	<25	NP-8
	7-68	Clay loam, silty clay, clay.	CL, CH	A-7	0	95-100	90-100	85-100	70-90	40-75	15-45
11B--------------- Emporia	0-14	Fine sandy loam	CL, SC, SM, ML	A-2, A-4, A-6	0-3	90-100	80-100	50-95	25-65	<25	NP-15
	14-28	Sandy clay loam, sandy loam, clay loam.	SC, CL	A-2, A-4, A-6, A-7	0-2	90-100	80-100	45-95	25-70	20-50	8-30
	28-50	Sandy clay loam, clay loam, sandy clay.	SC, CL	A-2, A-4, A-6, A-7	0-2	90-100	80-100	45-95	30-80	25-50	8-30
	50-64	Stratified sandy loam to clay loam.	SM, SC, ML, CL	A-1, A-2, A-4, A-6	0-5	70-100	55-100	30-90	20-60	<40	NP-25
11C, 12F*--------- Emporia	0-14	Fine sandy loam	CL, SC, SM, ML	A-2, A-4, A-6	0-3	90-100	80-100	50-95	25-65	<25	NP-15
	14-28	Sandy clay loam, sandy loam, clay loam.	SC, CL	A-2, A-4, A-6, A-7	0-2	90-100	80-100	45-95	25-70	20-50	8-30
	28-45	Sandy clay loam, clay loam, sandy clay.	SC, CL	A-2, A-4, A-6, A-7	0-2	90-100	80-100	45-95	30-80	25-50	8-30
	45-64	Stratified sandy loam to clay loam.	SM, SC, ML, CL	A-1, A-2, A-4, A-6	0-5	70-100	55-100	30-90	20-60	<40	NP-25
13D*:											
Emporia----------	0-14	Fine sandy loam	CL, SC, SM, ML	A-2, A-4, A-6	0-3	90-100	80-100	50-95	25-65	<25	NP-15
	14-28	Sandy clay loam, sandy loam, clay loam.	SC, CL	A-2, A-4, A-6, A-7	0-2	90-100	80-100	45-95	25-70	20-50	8-30
	28-45	Sandy clay loam, clay loam, sandy clay.	SC, CL	A-2, A-4, A-6, A-7	0-2	90-100	80-100	45-95	30-80	25-50	8-30
	45-64	Stratified sandy loam to clay loam.	SM, SC, ML, CL	A-1, A-2, A-4, A-6	0-5	70-100	55-100	30-90	20-60	<40	NP-25
Slagle-----------	0-8	Sandy loam--------	SM, SC, ML, CL	A-2, A-4, A-6	0-3	95-100	90-100	55-95	30-75	<35	NP-15
	8-21	Fine sandy loam, sandy clay loam, loam.	SC, SM-SC, CL, CL-ML	A-2, A-4, A-6	0-2	95-100	90-100	65-85	35-60	20-40	5-20
	21-48	Sandy clay loam, loam, clay loam.	SC, CL	A-4, A-6, A-7	0-2	95-100	90-100	75-95	40-75	25-50	8-30
	48-65	Stratified loamy sand to clay loam.	SM, SC, ML, CL	A-2, A-4, A-6	0-5	90-100	75-100	40-90	20-70	<40	NP-25
14*--------------- Kinston	0-7	Loam--------------	ML, CL, CL-ML	A-4, A-6	0	100	98-100	85-100	50-97	17-40	4-15
	7-62	Loam, clay loam, sandy clay loam.	CL	A-4, A-6, A-7	0	100	95-100	75-100	60-95	20-45	8-22
15---------------- Levy	0-6	Silt loam---------	CL, CH, ML, MH	A-6, A-7	0	100	100	98-100	85-100	30-65	12-35
	6-60	Silty clay, clay:	CL, CH, ML, MH	A-6, A-7	0	100	100	98-100	85-100	35-65	15-35
16---------------- Lynchburg	0-9	Loam--------------	SM, ML	A-2, A-4	0	92-100	90-100	75-100	25-65	<30	NP-7
	9-65	Sandy clay loam, loam, clay loam.	SM-SC, SC, CL, CL-ML	A-2, A-4, A-6	0	92-100	90-100	70-100	25-67	15-40	4-18

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
17*:											
Lynchburg	0-9	Loam	SM, ML	A-2, A-4	0	92-100	90-100	75-100	25-65	<30	NP-7
	9-65	Sandy clay loam, loam, clay loam.	SM-SC, SC, CL, CL-ML	A-2, A-4, A-6	0	92-100	90-100	70-100	25-67	15-40	4-18
Slagle	0-10	Sandy loam	SM, SC, ML, CL	A-2, A-4, A-6	0-3	95-100	90-100	55-95	30-75	<35	NP-15
	10-21	Fine sandy loam, sandy clay loam, loam.	SC, SM-SC, CL, CL-ML	A-2, A-4, A-6	0-2	95-100	90-100	65-85	35-60	20-40	5-20
	21-48	Sandy clay loam, loam, clay loam.	SC, CL	A-4, A-6, A-7	0-2	95-100	90-100	75-95	40-75	25-50	8-30
	48-65	Stratified loamy sand to clay loam.	SM, SC, ML, CL	A-2, A-4, A-6	0-5	90-100	75-100	40-90	20-70	<40	NP-25
18A, 18B Montross	0-7	Silt loam	ML, CL, CL-ML	A-4, A-6	0	98-100	95-100	75-90	55-80	15-30	2-15
	7-26	Silt loam, silty clay loam, clay loam.	CL	A-6, A-7	0	98-100	95-100	80-90	65-90	25-45	10-25
	26-86	Silty clay loam, clay loam, silty clay.	CL, CH	A-6, A-7	0	95-100	90-100	80-90	65-90	35-60	15-25
19 Muckalee	0-14	Loam	ML, SC, SM, SM-SC	A-2, A-4	0	95-100	90-100	50-95	30-60	<30	NP-10
	14-60	Sandy loam, loamy sand.	SM	A-2, A-4	0	95-100	80-100	60-90	20-40	<20	NP-4
20 Newflat	0-5	Silt loam	SM, SC, CL-ML	A-4	0	95-100	90-100	75-95	45-90	<25	NP-8
	5-10	Loam, clay loam, silty clay loam.	CL, CH	A-6, A-7	0	95-100	90-100	85-100	65-90	30-55	12-30
	10-75	Clay loam, silty clay, clay.	CL, CH	A-7	0	95-100	90-100	85-100	70-90	40-75	15-45
21 Norfolk	0-16	Fine sandy loam	SM, SM-SC, SC	A-2	0	95-100	95-100	50-91	15-33	<25	NP-14
	16-38	Sandy loam, sandy clay loam, fine sandy loam.	SC, SM-SC, CL, CL-ML	A-2, A-4, A-6	0	95-100	91-100	70-96	30-55	20-38	4-15
	38-98	Sandy clay loam, clay loam, sandy clay.	SC, SM-SC, CL, CL-ML	A-4, A-6, A-7-6	0	100	98-100	65-98	36-72	20-45	4-22
22A, 22B Pamunkey	0-16	Loam	ML, CL, CL-ML	A-4	0	80-100	75-100	65-95	50-85	18-30	2-10
	16-55	Sandy clay loam, clay loam, loam.	CL, SC	A-2, A-6	0-5	80-100	75-100	70-95	30-75	30-40	10-20
	55-72	Stratified sandy loam to sand.	SW, SM, SW-SM, SM-SC	A-1, A-2, A-3	0-10	60-100	50-95	25-70	2-35	<20	NP-6
23A, 23B, 23C Peawick	0-3	Silt loam	SM, SC, CL-ML	A-4	0	90-100	75-100	50-100	40-90	15-30	NP-8
	3-76	Clay loam, silty clay, clay.	CL, CH	A-6, A-7	0	90-100	75-100	70-100	70-95	35-80	12-50
24 Rain	0-13	Loam	SM, ML	A-2, A-4	0	100	95-100	50-85	25-56	<35	NP-10
	13-48	Loam, clay loam.	SC, SM-SC, CL, CL-ML	A-2, A-4, A-6	0	100	95-100	55-98	30-70	18-40	4-20
	48-62	Loam, clay loam, sandy clay.	SC, SM-SC, CL, CL-ML	A-4, A-6, A-7	0	100	98-100	60-98	36-72	18-45	4-28
	62-99	Stratified loamy fine sand to sandy clay.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
25A, 25B--------- Slagle	0-10	Sandy loam-------	SM, SC, ML, CL	A-2, A-4, A-6	0-3	95-100	90-100	55-95	30-75	<35	NP-15
	10-21	Fine sandy loam, sandy clay loam, loam.	SC, SM-SC, CL, CL-ML	A-2, A-4, A-6	0-2	95-100	90-100	65-85	35-60	20-40	5-20
	21-48	Sandy clay loam, loam, clay loam.	SC, CL	A-4, A-6, A-7	0-2	95-100	90-100	75-95	40-75	25-50	8-30
	48-65	Stratified loamy sand to clay loam.	SM, SC, ML, CL	A-2, A-4, A-6	0-5	90-100	75-100	40-90	20-70	<40	NP-25
25C-------------- Slagle	0-8	Sandy loam-------	SM, SC, ML, CL	A-2, A-4, A-6	0-3	95-100	90-100	55-95	30-75	<35	NP-15
	8-21	Fine sandy loam, sandy clay loam, loam.	SC, SM-SC, CL, CL-ML	A-2, A-4, A-6	0-2	95-100	90-100	65-85	35-60	20-40	5-20
	21-48	Sandy clay loam, loam, clay loam.	SC, CL	A-4, A-6, A-7	0-2	95-100	90-100	75-95	40-75	25-50	8-30
	48-65	Stratified loamy sand to clay loam.	SM, SC, ML, CL	A-2, A-4, A-6	0-5	90-100	75-100	40-90	20-70	<40	NP-25
26*, 27*. Udorthents											
28*. Urban land											
29*: Urban land.											
Udorthents.											
30A, 30B, 30C---- Wickham	0-9	Fine sandy loam	SM, SM-SC, ML, CL-ML	A-4	0	95-100	90-100	70-100	45-80	<25	NP-7
	9-62	Sandy clay loam, clay loam, loam.	CL-ML, CL, SC, SM-SC	A-2, A-4, A-6, A-7-6	0	95-100	90-100	75-100	30-70	20-41	5-15
	62-88	Stratified loamy sand to sandy clay loam.	SM, SC, ML, CL	A2, A-4, A-6	0-2	90-100	75-100	40-90	20-70	<40	NP-15

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated]

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	G/cm3	In/hr	In/in	pH				Pct
1A, 1B, 1C-------- Ackwater	0-5	8-15	1.20-1.30	0.6-2.0	0.10-0.17	3.6-5.5	Low-----------	0.43	2	.5-2
	5-16	25-40	1.30-1.40	0.2-0.6	0.12-0.19	3.6-5.5	Moderate-----	0.32		
	16-72	35-60	1.30-1.50	0.06-0.2	0.12-0.16	3.6-5.5	High----------	0.32		
2C3, 2D3--------- Ackwater	0-5	27-40	1.30-1.40	0.2-0.6	0.15-0.19	3.6-5.5	Moderate-----	0.37	1	.3-.8
	5-60	35-60	1.30-1.50	0.06-0.2	0.12-0.16	3.6-5.5	High----------	0.32		
3----------------- Argent	0-11	10-35	1.20-1.40	0.6-2.0	0.15-0.20	4.5-6.0	Low-----------	0.32	5	1-2
	11-82	35-60	1.30-1.50	0.06-0.2	0.14-0.18	4.5-6.0	Moderate-----	0.32		
	82-97	20-40	1.20-1.50	0.06-0.2	0.12-0.16	5.6-6.5	Moderate-----	0.32		
4A, 4B------------ Aycock	0-25	4-15	1.30-1.60	2.0-5.5	0.15-0.20	4.5-5.5	Low-----------	0.37	4	1-2
	25-64	18-35	1.30-1.60	0.6-2.0	0.15-0.20	4.5-5.5	Low-----------	0.43		
5----------------- Bojac	0-9	3-8	1.20-1.50	6.0-20	0.05-0.08	5.6-7.3	Low-----------	0.28	3	.5-1
	9-36	11-16	1.35-1.55	2.0-6.0	0.08-0.17	5.6-7.3	Low-----------	0.28		
	36-64	1-8	1.30-1.50	6.0-20	0.02-0.07	5.6-7.3	Low-----------	0.28		
6----------------- Bolling	0-12	5-20	1.20-1.55	0.6-6.0	0.10-0.20	5.1-7.3	Low-----------	0.28	4	1-2
	12-63	20-35	1.30-1.60	0.6-2.0	0.13-0.19	5.1-7.3	Low-----------	0.28		
7B, 7C------------ Bonneau	0-25	5-15	1.30-1.70	6.0-20	0.05-0.11	4.5-5.5	Low-----------	0.15	5	.5-2
	25-80	18-35	1.40-1.60	0.6-2.0	0.10-0.15	4.5-5.5	Low-----------	0.20		
8A, 8B------------ Burrowsville	0-14	4-12	1.20-1.35	2.0-6.0	0.12-0.16	3.6-5.5	Low-----------	0.32	3	.5-1
	14-25	6-18	1.25-1.40	2.0-6.0	0.12-0.16	3.6-5.5	Low-----------	0.28		
	25-38	6-18	1.65-1.85	0.06-0.6	0.06-0.09	3.6-5.5	Low-----------	0.28		
	38-51	10-30	1.30-1.50	0.6-2.0	0.11-0.16	3.6-5.5	Low-----------	0.28		
	51-70	8-22	1.30-1.50	0.6-2.0	0.11-0.16	3.6-5.5	Low-----------	0.28		
9----------------- Catpoint	0-22	0-5	1.20-1.50	6.0-20	0.04-0.08	5.1-6.5	Low-----------	0.10	5	.5-1
	22-62	0-10	1.45-1.65	6.0-20	0.02-0.10	5.1-6.5	Low-----------	0.10		
	62-84	0-10	1.45-1.65	6.0-20	0.01-0.08	5.1-6.5	Low-----------	0.10		
10---------------- Chickahominy	0-7	10-25	1.20-1.30	0.6-2.0	0.10-0.17	3.6-5.0	Low-----------	0.37	4	.5-2
	7-68	35-60	1.30-1.50	<0.06	0.10-0.19	3.6-5.0	High----------	0.24		
11B--------------- Emporia	0-14	7-18	1.30-1.40	2.0-6.0	0.10-0.17	4.5-5.5	Low-----------	0.28	4	.5-2
	14-28	18-35	1.35-1.45	0.6-2.0	0.10-0.18	4.5-5.5	Low-----------	0.28		
	28-50	21-40	1.45-1.60	0.2-0.6	0.10-0.16	4.5-5.5	Moderate-----	0.20		
	50-64	5-40	1.45-1.60	0.2-2.0	0.08-0.18	4.5-5.5	Moderate-----	0.20		
11C, 12F*--------- Emporia	0-14	7-18	1.30-1.40	2.0-6.0	0.10-0.17	4.5-5.5	Low-----------	0.28	4	.5-2
	14-28	18-35	1.35-1.45	0.6-2.0	0.10-0.18	4.5-5.5	Low-----------	0.28		
	28-45	21-40	1.45-1.60	0.2-0.6	0.10-0.16	4.5-5.5	Moderate-----	0.20		
	45-64	5-40	1.45-1.60	0.2-2.0	0.08-0.18	4.5-5.5	Moderate-----	0.20		
13D*:										
Emporia-----------	0-14	7-18	1.30-1.40	2.0-6.0	0.10-0.17	4.5-5.5	Low-----------	0.28	4	.5-2
	14-28	18-35	1.35-1.45	0.6-2.0	0.10-0.18	4.5-5.5	Low-----------	0.28		
	28-45	21-40	1.45-1.60	0.2-0.6	0.10-0.16	4.5-5.5	Moderate-----	0.20		
	45-64	5-40	1.45-1.60	0.2-2.0	0.08-0.18	4.5-5.5	Moderate-----	0.20		
Slagle------------	0-8	8-22	1.30-1.45	2.0-6.0	0.10-0.17	4.5-5.5	Low-----------	0.24	3	.5-1
	8-21	12-35	1.30-1.45	0.6-2.0	0.10-0.18	4.5-5.5	Low-----------	0.24		
	21-48	18-40	1.35-1.60	0.2-0.6	0.12-0.18	4.5-5.5	Moderate-----	0.24		
	48-65	5-32	1.35-1.50	0.2-2.0	0.08-0.15	4.5-5.5	Low-----------	0.24		
14*--------------- Kinston	0-7	5-27	1.30-1.50	0.6-2.0	0.14-0.20	4.5-5.5	Low-----------	0.24	5	2-4
	7-62	18-35	1.30-1.50	0.6-2.0	0.14-0.18	4.5-5.5	Low-----------	0.32		
15---------------- Levy	0-6	27-50	0.50-1.00	0.06-0.2	0.16-0.22	4.5-5.5	High----------	0.32	5	4-8
	6-60	35-60	0.25-1.10	0.06-0.2	0.16-0.22	4.5-5.5	High----------	0.32		

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	G/cm^3	In/hr	In/in	pH				Pct
16---------------- Lynchburg	0-9	5-20	1.30-1.60	2.0-6.0	0.09-0.13	4.5-5.5	Low-----------	0.20	4	.5-2
	9-65	18-35	1.30-1.50	0.6-2.0	0.12-0.16	4.5-5.5	Low-----------	0.20		
17*:										
Lynchburg--------	0-9	5-20	1.30-1.60	2.0-6.0	0.09-0.13	4.5-5.5	Low-----------	0.20	4	.5-2
	9-65	18-35	1.30-1.50	0.6-2.0	0.12-0.16	4.5-5.5	Low-----------	0.20		
Slagle-----------	0-10	8-22	1.30-1.45	2.0-6.0	0.10-0.17	4.5-5.5	Low-----------	0.24	3	.5-1
	10-21	12-35	1.30-1.45	0.6-2.0	0.10-0.18	4.5-5.5	Low-----------	0.24		
	21-48	18-40	1.35-1.60	0.2-0.6	0.12-0.18	4.5-5.5	Moderate------	0.24		
	48-65	5-32	1.35-1.50	0.2-2.0	0.08-0.15	4.5-5.5	Low-----------	0.24		
18A, 18B---------- Montross	0-7	5-15	1.10-1.30	0.6-2.0	0.14-0.20	3.6-5.5	Low-----------	0.49	5	1-2
	7-26	20-35	1.20-1.50	0.6-2.0	0.16-0.20	3.6-5.5	Low-----------	0.55		
	26-86	27-45	1.45-1.70	0.2-0.6	0.10-0.16	3.6-5.5	Moderate------	0.37		
19---------------- Muckalee	0-14	10-18	1.30-1.50	0.6-2.0	0.09-0.15	5.1-6.5	Low-----------	0.20	4	2-4
	14-60	5-18	1.30-1.50	0.6-2.0	0.08-0.12	5.6-7.3	Low-----------	0.20		
20---------------- Newflat	0-5	10-25	1.20-1.30	0.6-2.0	0.10-0.17	3.6-5.0	Low-----------	0.37	4	.5-1
	5-10	25-40	1.25-1.35	0.2-0.6	0.12-0.19	3.6-5.0	Moderate------	0.37		
	10-75	35-60	1.30-1.50	<0.06	0.10-0.19	3.6-5.0	High----------	0.24		
21---------------- Norfolk	0-16	5-18	1.45-1.65	2.0-6.0	0.10-0.15	4.5-5.5	Low-----------	0.17	5	.5-2
	16-38	18-35	1.35-1.45	0.6-2.0	0.10-0.15	4.5-5.5	Low-----------	0.24		
	38-98	20-40	1.30-1.40	0.6-2.0	0.10-0.15	4.5-5.5	Low-----------	0.24		
22A, 22B---------- Pamunkey	0-16	5-15	1.25-1.55	0.6-2.0	0.14-0.20	4.5-6.0	Low-----------	0.28	4	.5-2
	16-55	20-35	1.35-1.65	0.6-2.0	0.13-0.19	5.6-7.3	Low-----------	0.28		
	55-72	4-18	1.40-1.65	2.0-20	0.04-0.12	5.6-7.3	Low-----------	0.28		
23A, 23B, 23C----- Peawick	0-3	10-25	1.20-1.30	0.6-2.0	0.10-0.17	3.6-5.0	Low-----------	0.37	4	.5-2
	3-76	35-60	1.30-1.50	<0.06	0.10-0.17	3.6-5.0	High----------	0.24		
24---------------- Rains	0-13	5-20	1.30-1.60	2.0-6.0	0.08-0.12	4.5-5.5	Low-----------	0.17	5	1-2
	13-48	18-35	1.30-1.50	0.6-2.0	0.10-0.15	4.5-5.5	Low-----------	0.24		
	48-62	18-40	1.30-1.50	0.6-2.0	0.10-0.15	4.5-5.5	Low-----------	0.28		
	62-99	12-35	1.30-1.50	0.6-2.0	0.10-0.15	4.5-5.5	Low-----------	0.28		
25A, 25B---------- Slagle	0-10	8-22	1.30-1.45	2.0-6.0	0.10-0.17	4.5-5.5	Low-----------	0.24	3	.5-1
	10-21	12-35	1.30-1.45	0.6-2.0	0.10-0.18	4.5-5.5	Low-----------	0.24		
	21-48	18-40	1.35-1.60	0.2-0.6	0.12-0.18	4.5-5.5	Moderate------	0.24		
	48-65	5-32	1.35-1.50	0.2-2.0	0.08-0.15	4.5-5.5	Low-----------	0.24		
25C--------------- Slagle	0-8	8-22	1.30-1.45	2.0-6.0	0.10-0.17	4.5-5.5	Low-----------	0.24	3	.5-1
	8-21	12-35	1.30-1.45	0.6-2.0	0.10-0.18	4.5-5.5	Low-----------	0.24		
	21-48	18-40	1.35-1.60	0.2-0.6	0.12-0.18	4.5-5.5	Moderate------	0.24		
	48-65	5-32	1.35-1.50	0.2-2.0	0.08-0.15	4.5-5.5	Low-----------	0.24		
26*, 27*. Udorthents										
28*. Urban land										
29*:										
Urban land.										
Udorthents.										
30A, 30B, 30C----- Wickham	0-9	8-15	1.45-1.65	2.0-6.0	0.11-0.16	4.5-6.0	Low-----------	0.20	5	.5-2
	9-62	18-25	1.30-1.40	0.6-2.0	0.12-0.17	4.5-6.0	Low-----------	0.24		
	62-88	8-15	1.30-1.40	0.6-2.0	0.04-0.10	4.5-6.0	Low-----------	0.24		

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--SOIL AND WATER FEATURES

["Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern]

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard-ness	Uncoated steel	Concrete
					Ft			In			
1A, 1B, 1C, 2C3, 2D3----------------- Ackwater	D	None---------	---	---	1.5-3.0	Perched	Nov-Mar	>60	---	High------	High.
3----------------- Argent	D	None---------	---	---	0-1.0	Apparent	Nov-Apr	>60	---	High------	High.
4A, 4B------------- Aycock	B	None---------	---	---	4.0-6.0	Perched	Jan-Apr	>60	---	Moderate	High.
5----------------- Bojac	B	None---------	---	---	4.0-6.0	Apparent	Nov-Apr	>60	---	Low-------	High.
6----------------- Bolling	C	Occasional	Very brief	Mar-Jul	1.5-2.5	Apparent	Dec-Mar	>60	---	Moderate	High.
7B, 7C------------- Bonneau	A	None---------	---	---	3.5-5.0	Apparent	Dec-Mar	>60	---	Low-------	High.
8A, 8B------------- Burrowsville	C	None---------	---	---	1.5-3.0	Perched	Dec-Apr	>60	---	Moderate	High.
9----------------- Catpoint	A	None---------	---	---	4.0-6.0	Apparent	Feb-Apr	>60	---	Low-------	Moderate.
10---------------- Chickahominy	D	None---------	---	---	0-0.5	Apparent	Nov-Apr	>60	---	High------	High.
11B, 11C, 12F*----- Emporia	C	None---------	---	---	3.0-4.5	Perched	Nov-Apr	>60	---	Moderate	High.
13D*:											
Emporia-----------	C	None---------	---	---	3.0-4.5	Perched	Nov-Apr	>60	---	Moderate	High.
Slagle------------	C	None---------	---	---	1.5-3.0	Perched	Nov-Apr	>60	---	Moderate	High.
14*--------------- Kinston	D	Frequent-----	Brief------	Nov-Jun	0-1.0	Apparent	Nov-Jun	>60	---	High------	High.
15---------------- Levy	D	Frequent-----	Very long	Jan-Dec	+2-+1	Apparent	Jan-Dec	>60	---	High------	High.
16---------------- Lynchburg	B/D	None---------	---	---	0.5-1.5	Apparent	Nov-Apr	>60	---	High------	High.
17*:											
Lynchburg---------	B/D	None---------	---	---	0.5-1.5	Apparent	Nov-Apr	>60	---	High------	High.
Slagle------------	C	None---------	---	---	1.5-3.0	Perched	Nov-Apr	>60	---	Moderate	High.
18A, 18B----------- Montross	C	None---------	---	---	1.5-2.5	Perched	Dec-Apr	>60	---	High------	High.
19---------------- Muckalee	D	Frequent-----	Brief------	Nov-Apr	0.5-1.5	Apparent	Dec-Mar	>60	---	High------	Moderate.
20---------------- Newflat	D	None---------	---	---	0.5-1.5	Apparent	Nov-Apr	>60	---	High------	High.
21---------------- Norfolk	B	None---------	---	---	4.0-6.0	Perched	Jan-Mar	>60	---	Moderate	High.
22A, 22B----------- Pamunkey	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.

See footnote at end of table.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard-ness	Uncoated steel	Concrete
					Ft			In			
23A, 23B, 23C----- Peawick	D	None---------	---	---	1.5-3.0	Perched	Nov-Mar	>60	---	High-----	High.
24--------------- Rains	B/D	None---------	---	---	0-1.0	Apparent	Nov-Apr	>60	---	High-----	High.
25A, 25B, 25C----- Slagle	C	None---------	---	---	1.5-3.0	Perched	Nov-Apr	>60	---	Moderate	High.
26*, 27*. Udorthents											
28*. Urban land											
29*: Urban land.											
Udorthents.											
30A, 30B, 30C----- Wickham	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	High.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--CLASSIFICATION OF THE SOILS

[An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series]

Soil name	Family or higher taxonomic class
Ackwater	Clayey, mixed, thermic Aquic Paleudults
Argent	Fine, mixed, thermic Typic Ochraqualfs
Aycock	Fine-silty, siliceous, thermic Typic Paleudults
*Bojac	Coarse-loamy, mixed, thermic Typic Hapludults
*Bolling	Fine-loamy, mixed, thermic Aquic Hapludalfs
Bonneau	Loamy, siliceous, thermic Arenic Paleudults
Burrowsville	Coarse-loamy, siliceous, thermic Typic Fragiudults
Catpoint	Siliceous, thermic Ultic Udipsamments
Chickahominy	Clayey, mixed, thermic, Typic Ochraquults
Emporia	Fine-loamy, siliceous, thermic Typic Hapludults
Kinston	Fine-loamy, siliceous, acid, thermic Typic Fluvaquents
Levy	Fine, mixed, acid, thermic Typic Hydraquents
*Lynchburg	Fine-loamy, siliceous, thermic Aeric Paleaquults
Montross	Fine-silty, siliceous, thermic Fragiaquic Paleudults
*Muckalee	Coarse-loamy, siliceous, nonacid, thermic Typic Fluvaquents
Newflat	Clayey, mixed, thermic Aeric Ochraquults
Norfolk	Fine-loamy, siliceous, thermic Typic Paleudults
Pamunkey	Fine-loamy, mixed, thermic Ultic Hapludalfs
Peawick	Clayey, mixed, thermic Aquic Hapludults
*Rains	Fine-loamy, siliceous, thermic Typic Paleaquults
Slagle	Fine-loamy, siliceous, thermic Aquic Hapludults
Udorthents	Udorthents
Wickham	Fine-loamy, mixed, thermic Typic Hapludults

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U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

GENERAL SOIL MAP

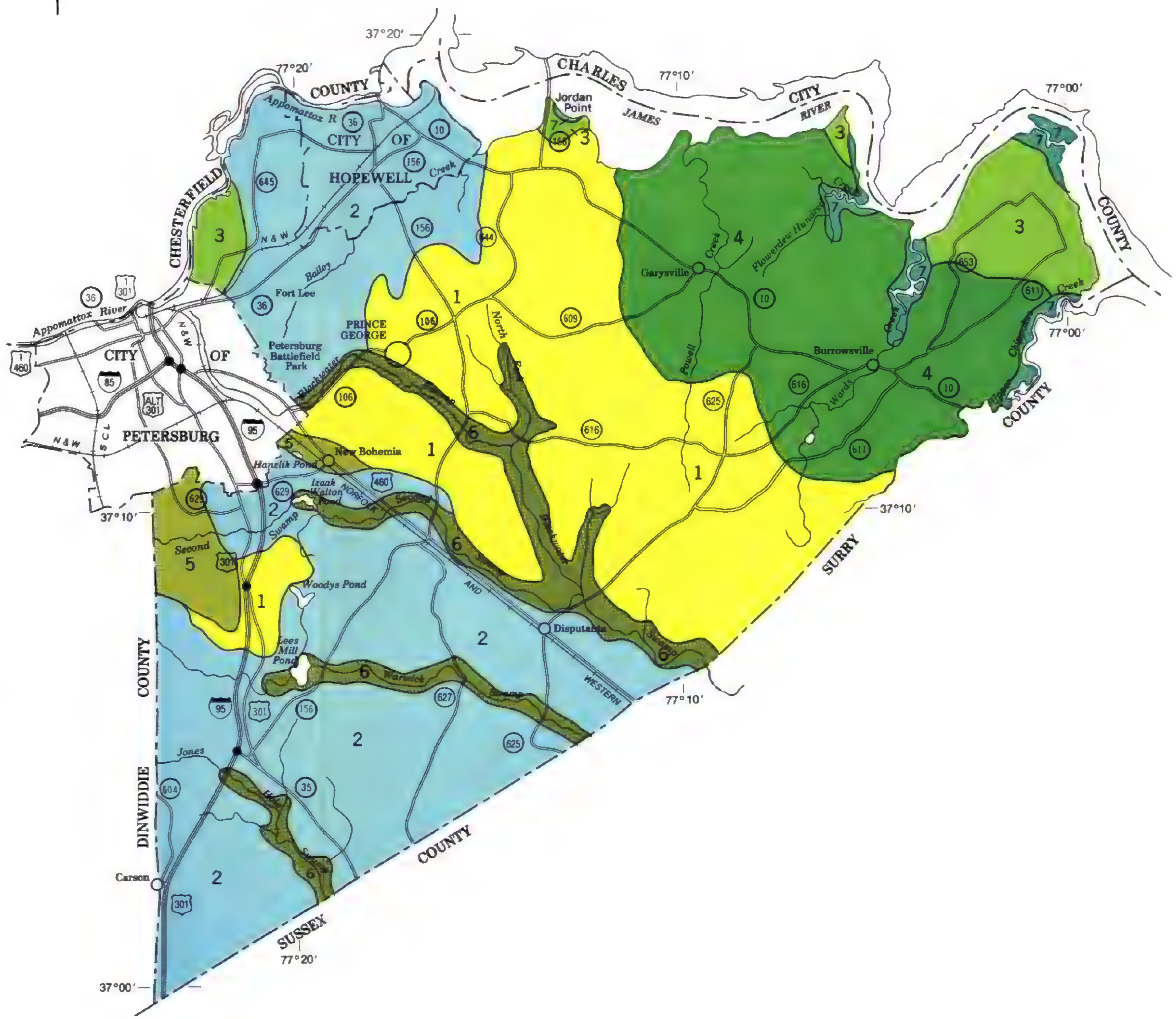
PRINCE GEORGE COUNTY, VIRGINIA

Scale 1:190,080

1 0 1 2 3 4 Miles

1 0 1 2 3 4 Kilometers

N



LEGEND

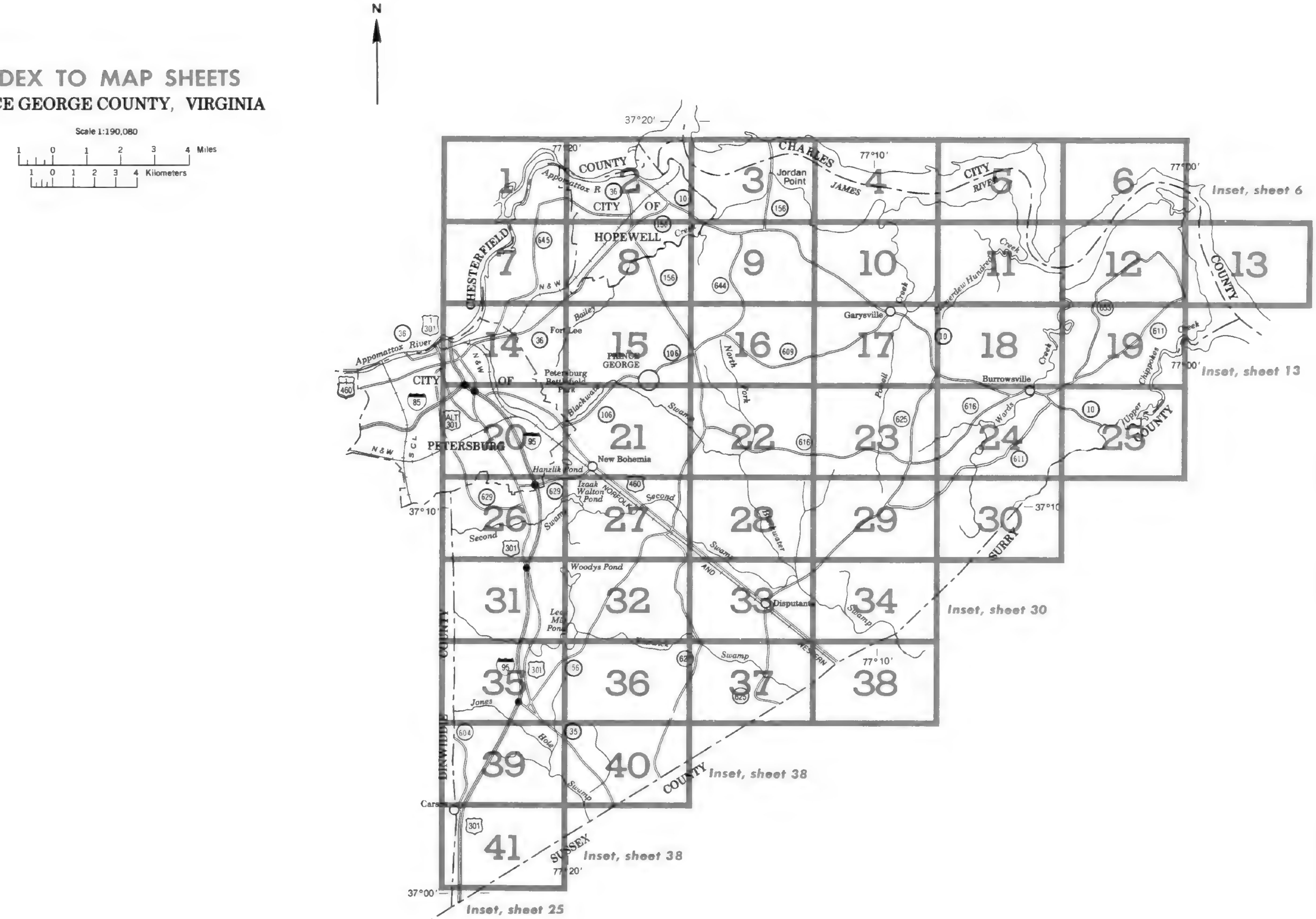
1	Ackwater-Montross-Aycock: Deep, moderately well drained and well drained soils that have a clayey or loamy subsoil; formed in fluvial and marine sediments on uplands
2	Slagle-Emporia-Bonneau: Deep, moderately well drained and well drained soils that have a loamy subsoil; formed in fluvial and marine sediments on uplands
3	Pamunkey-Argent-Bolling: Deep, well drained, poorly drained, and moderately well drained soils that have a loamy or clayey subsoil; formed in fluvial sediments on river and stream terraces
4	Peawick-Emporia-Wickham: Deep, moderately well drained and well drained soils that have a clayey or loamy subsoil; formed in fluvial sediments on uplands
5	Montross-Rains-Lynchburg: Deep, moderatley well drained, poorly drained, and somewhat poorly drained soils that have a loamy subsoil; formed in fluvial and marine sediments on uplands
6	Kinston: Deep, poorly drained soils that have a loamy substratum; formed in fluvial sediments on flood plains
7	Muckalee-Levy: Deep, poorly drained and very poorly drained soils that have a loamy or clayey substratum; formed in fluvial sediments on flood plains and tidal flats

Compiled 1983

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

INDEX TO MAP SHEETS
PRINCE GEORGE COUNTY, VIRGINIA

Scale 1:190,080

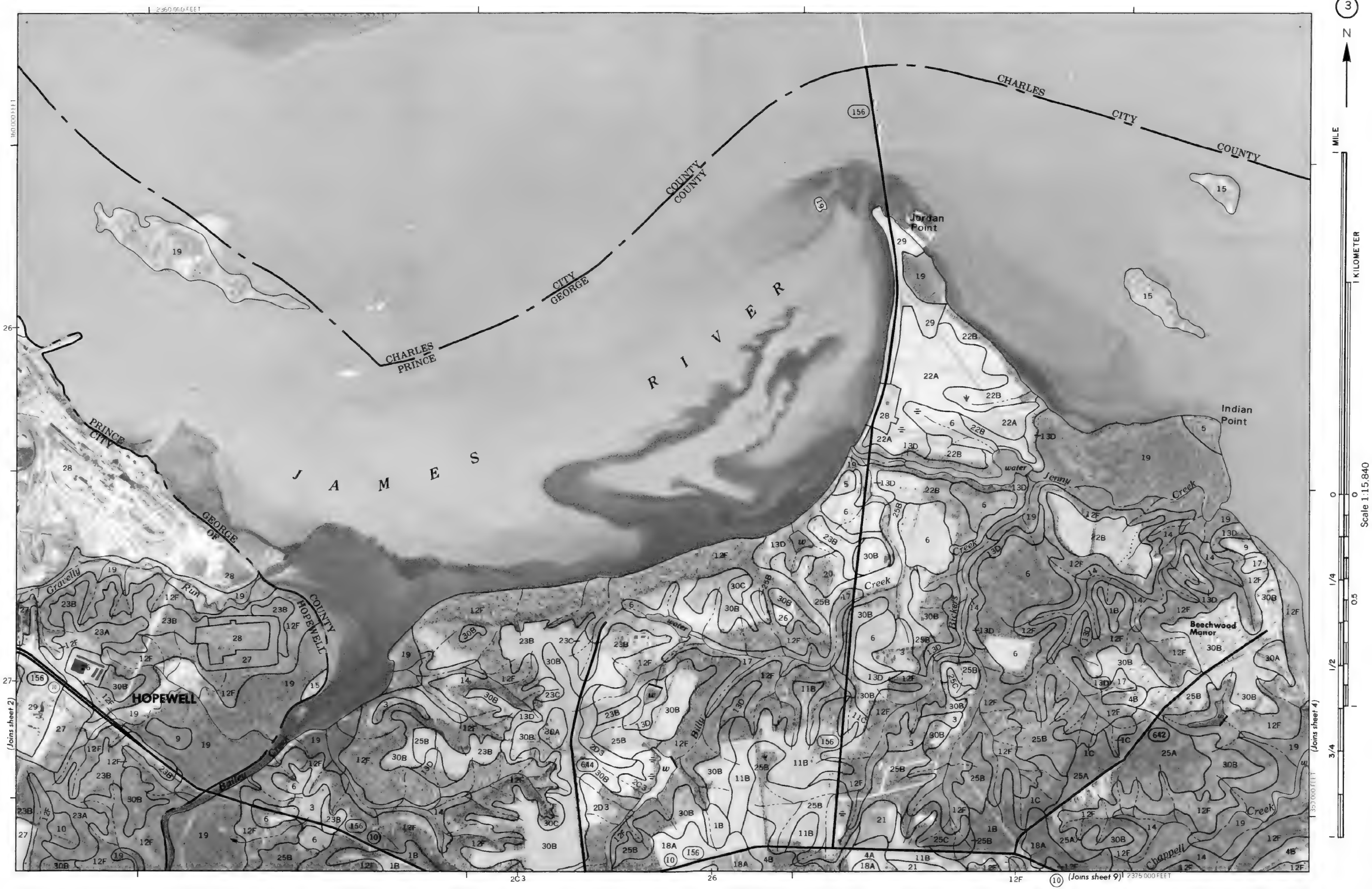


PRINCE GEORGE COUNTY, VIRGINIA NO. 1

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1971 aerial photography.
Coordinate grid ticks and land division corners, if shown are approximately positioned.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Base maps are controlled photomosaics prepared from 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

PRINCE GEORGE COUNTY, VIRGINIA NO. 2



PRINCE GEORGE COUNTY, VIRGINIA NO. 3

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SOIL SURVEY OF PRINCE GEORGE COUNTY, VIRGINIA — SHEET NUMBER 5

PRINCE GEORGE COUNTY, VIRGINIA NO. 5

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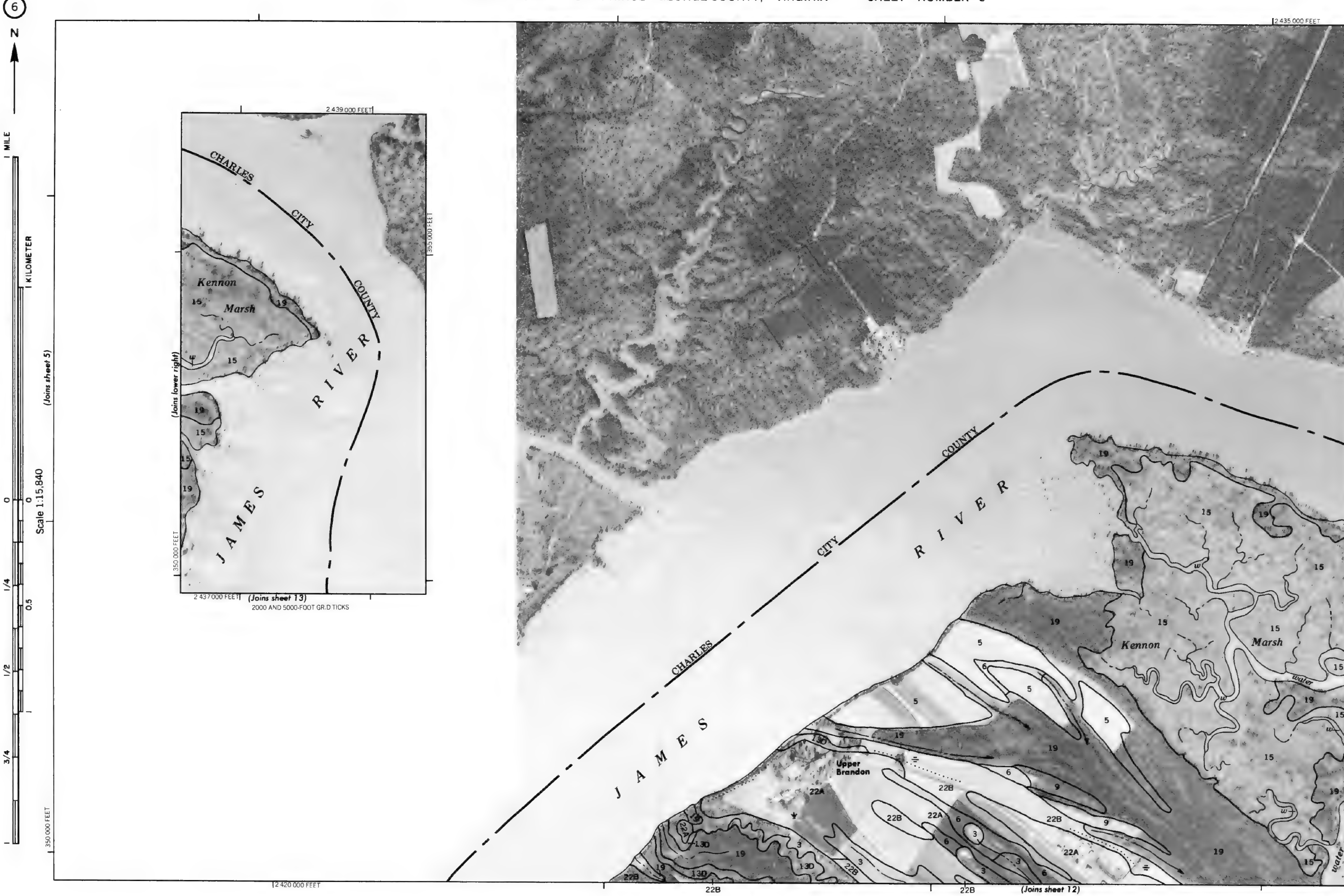
Coordinate grid ticks and land division corners, if shown are approximately positioned



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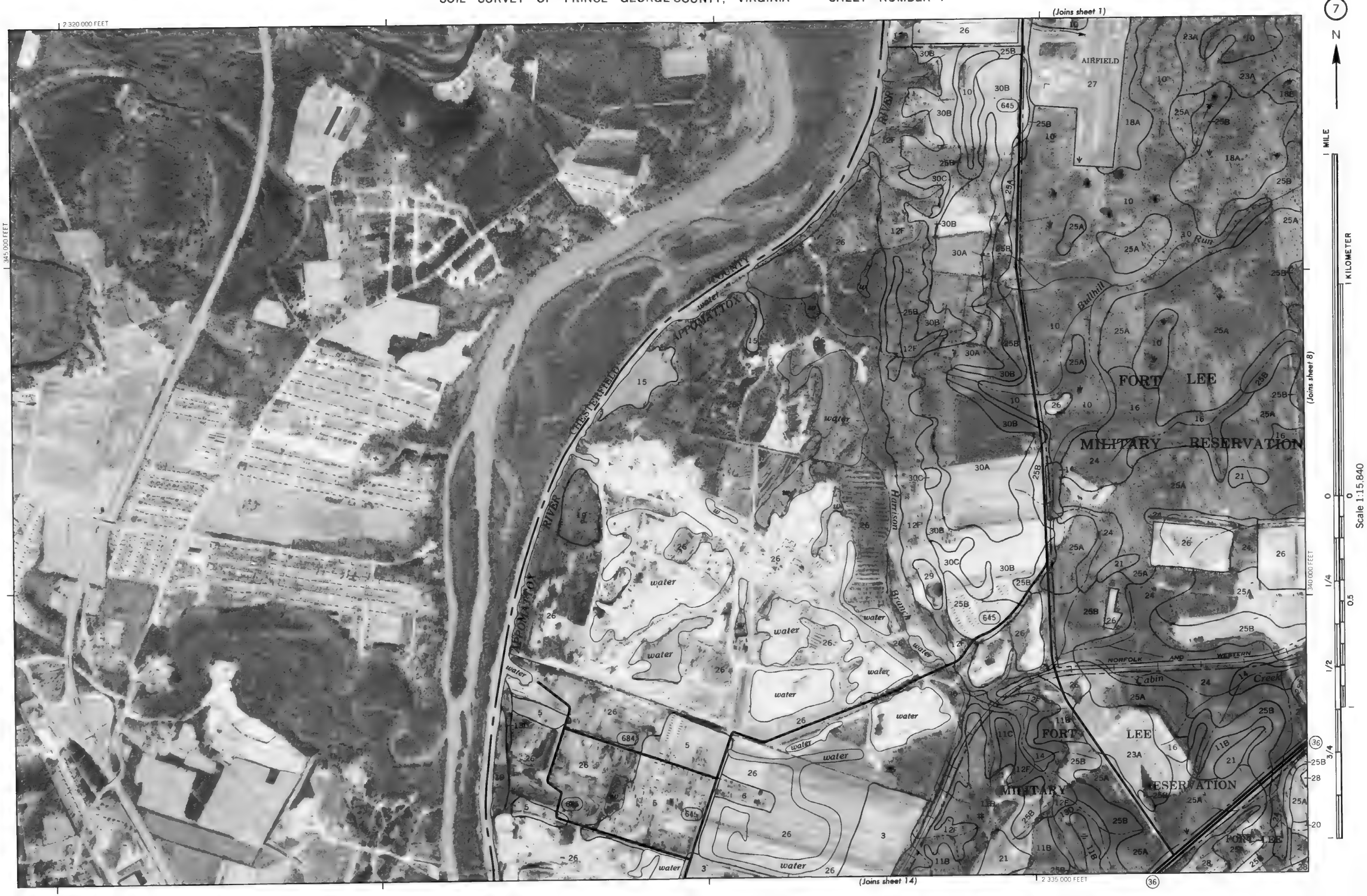
PRINCE GEORGE COUNTY, VIRGINIA NO. 6



PRINCE GEORGE COUNTY, VIRGINIA NO. 7

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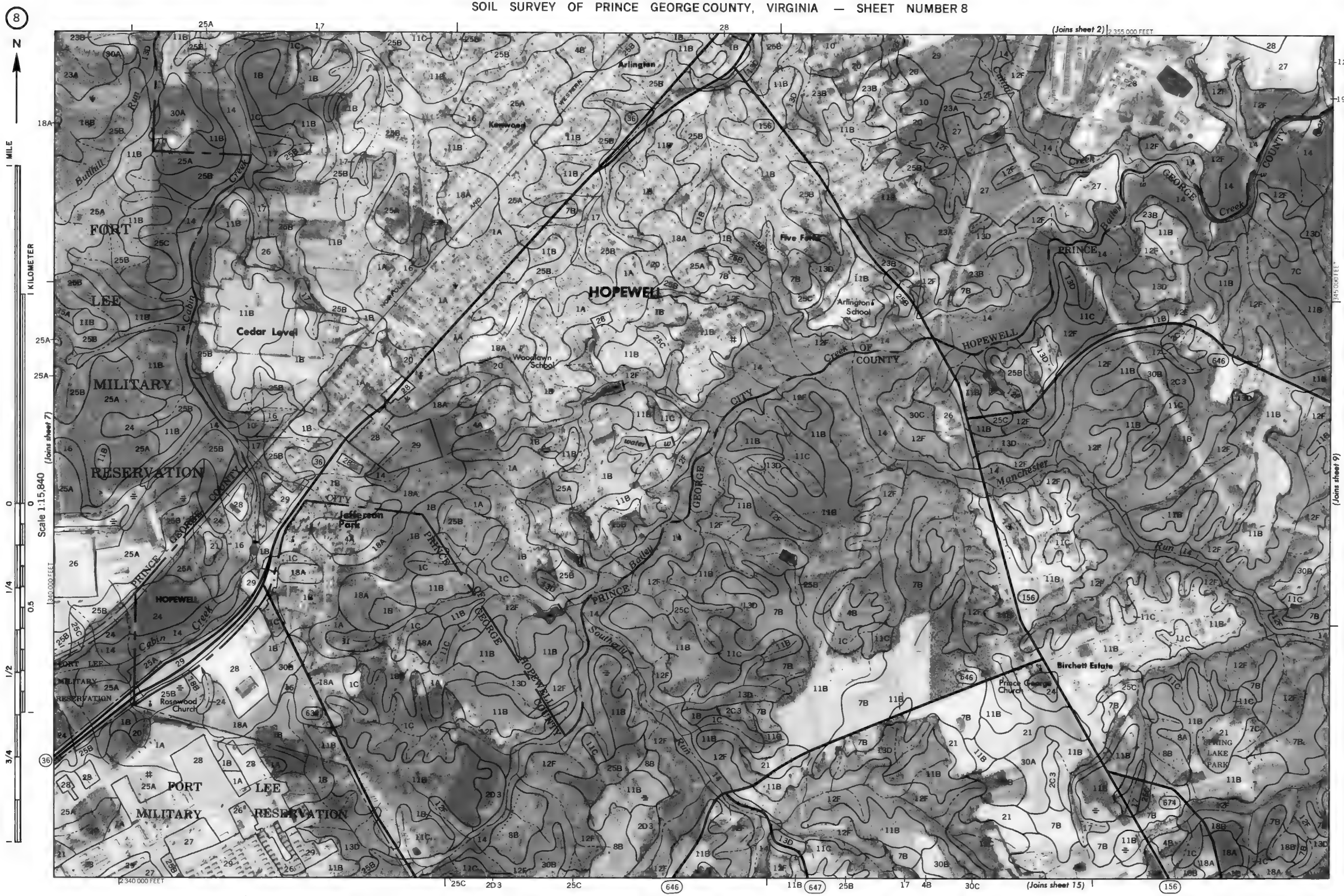
SOIL SURVEY OF PRINCE GEORGE COUNTY, VIRGINIA — SHEET NUMBER 8



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PRINCE GEORGE COUNTY, VIRGINIA NO. 8

PRINCE GEORGE COUNTY, VIRGINIA NO. 9.

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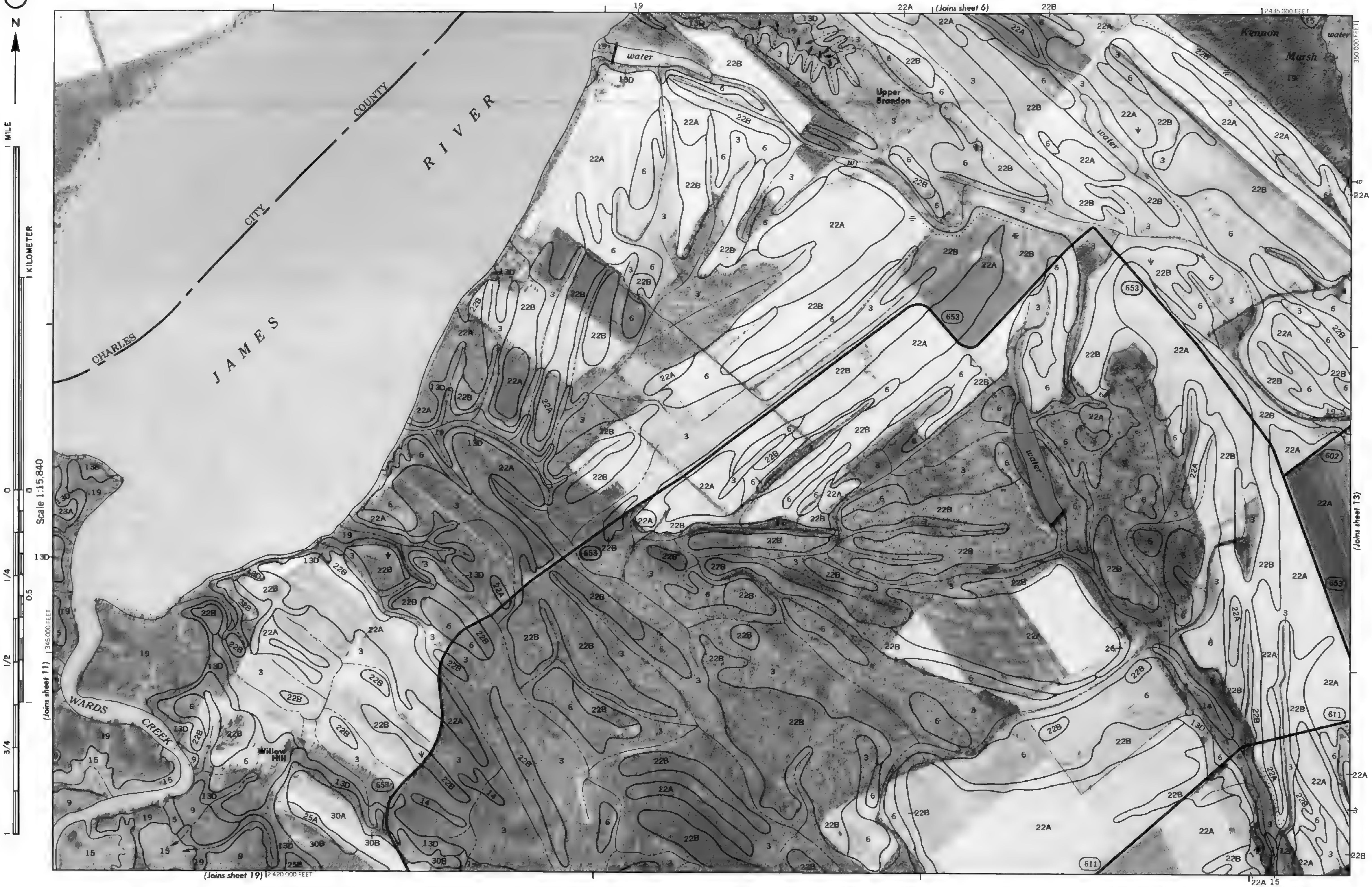
PRINCE GEORGE COUNTY, VIRGINIA NO. 10



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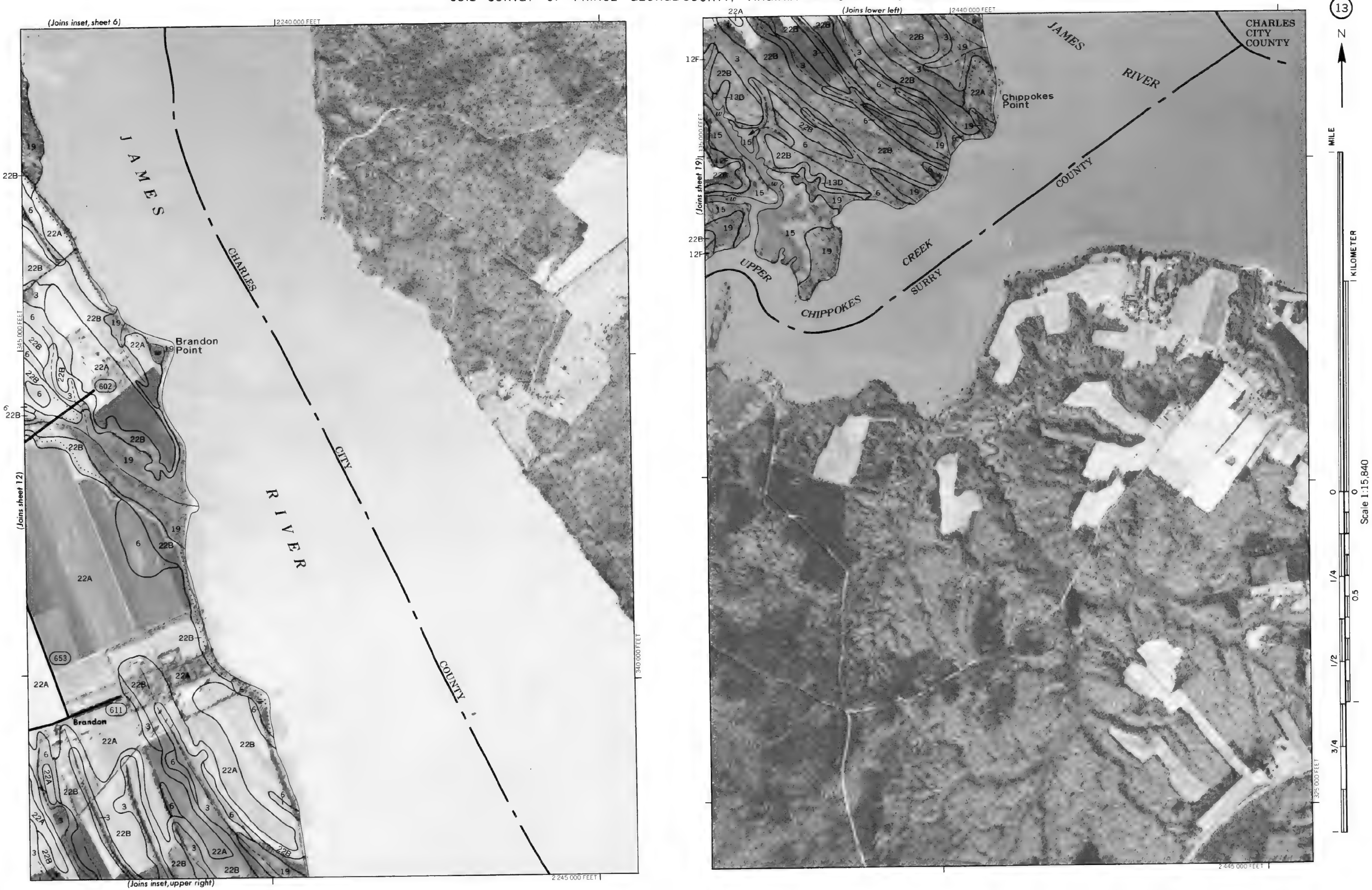

PRINCE GEORGE COUNTY, VIRGINIA NO. 13

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SOIL SURVEY OF PRINCE GEORGE COUNTY, VIRGINIA — SHEET NUMBER 14

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(15)

N

1 MILE

1 KILOMETER

Scale 1:15 840

PRINCE GEORGE COUNTY, VIRGINIA NO. 15

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1971 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

16

N

1 MILE

1 KILOMETER

Scale 1:15 840

0 — 1/4 — 1/2 — 3/4 — 1

0 — 0.5 — 1

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PRINCE GEORGE COUNTY, VIRGINIA NO. 16

PRINCE GEORGE COUNTY, VIRGINIA NO. 17

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Coordinate grid ticks and land division corners, if shown are approximately positioned

PRINCE GEORGE COUNTY, VIRGINIA NO. 18

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PRINCE GEORGE COUNTY, VIRGINIA NO. 19

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PRINCE GEORGE COUNTY, VIRGINIA NO. 20

1 MILE

1 KILOMETER

Scale 1:15,840

PRINCE GEORGE COUNTY, VIRGINIA NO. 21

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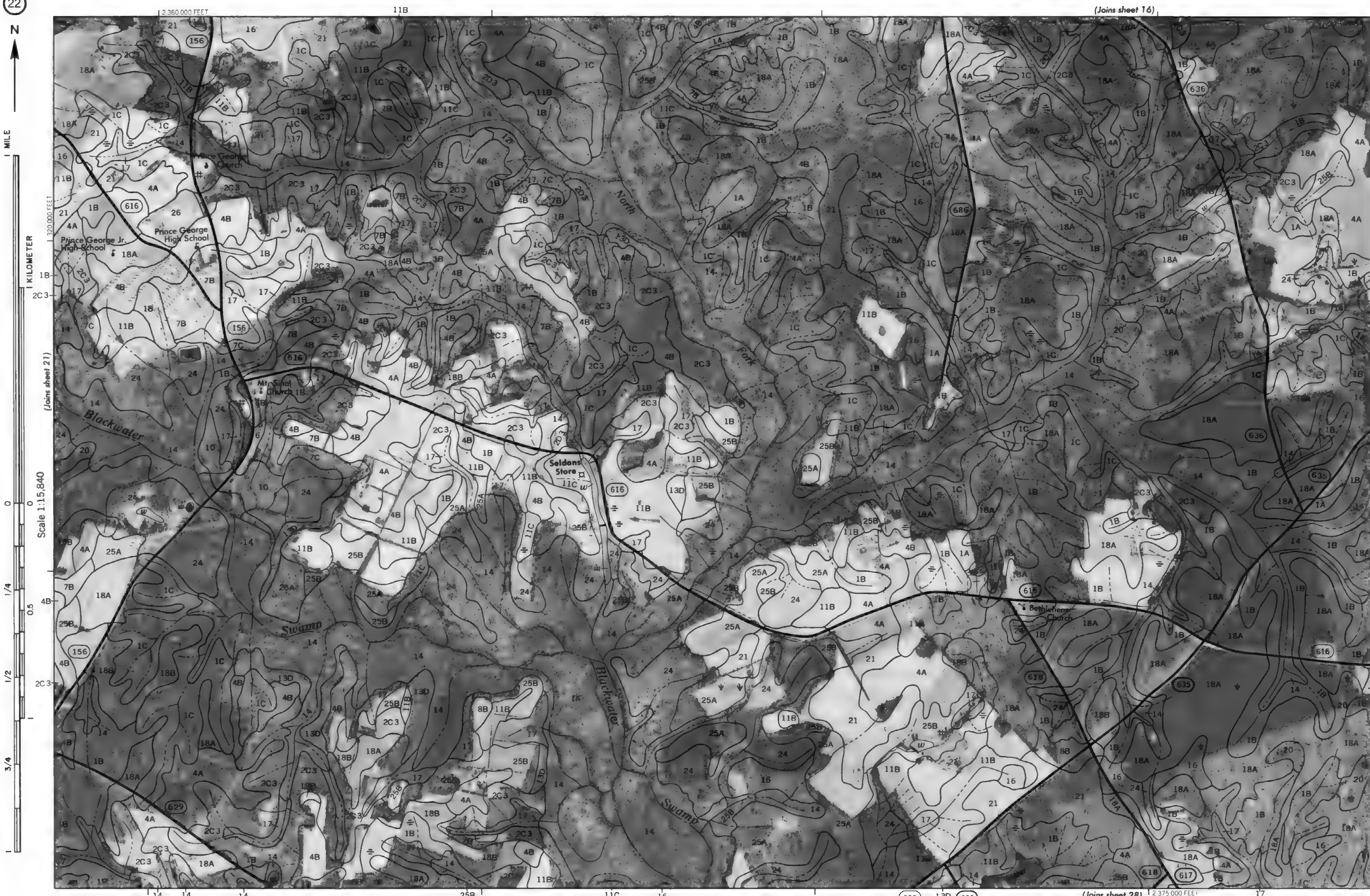

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PRINCE GEORGE COUNTY, VIRGINIA NO. 22

SOIL SURVEY OF PRINCE GEORGE COUNTY, VIRGINIA — SHEET NUMBER 23

PRINCE GEORGE COUNTY, VIRGINIA NO. 23

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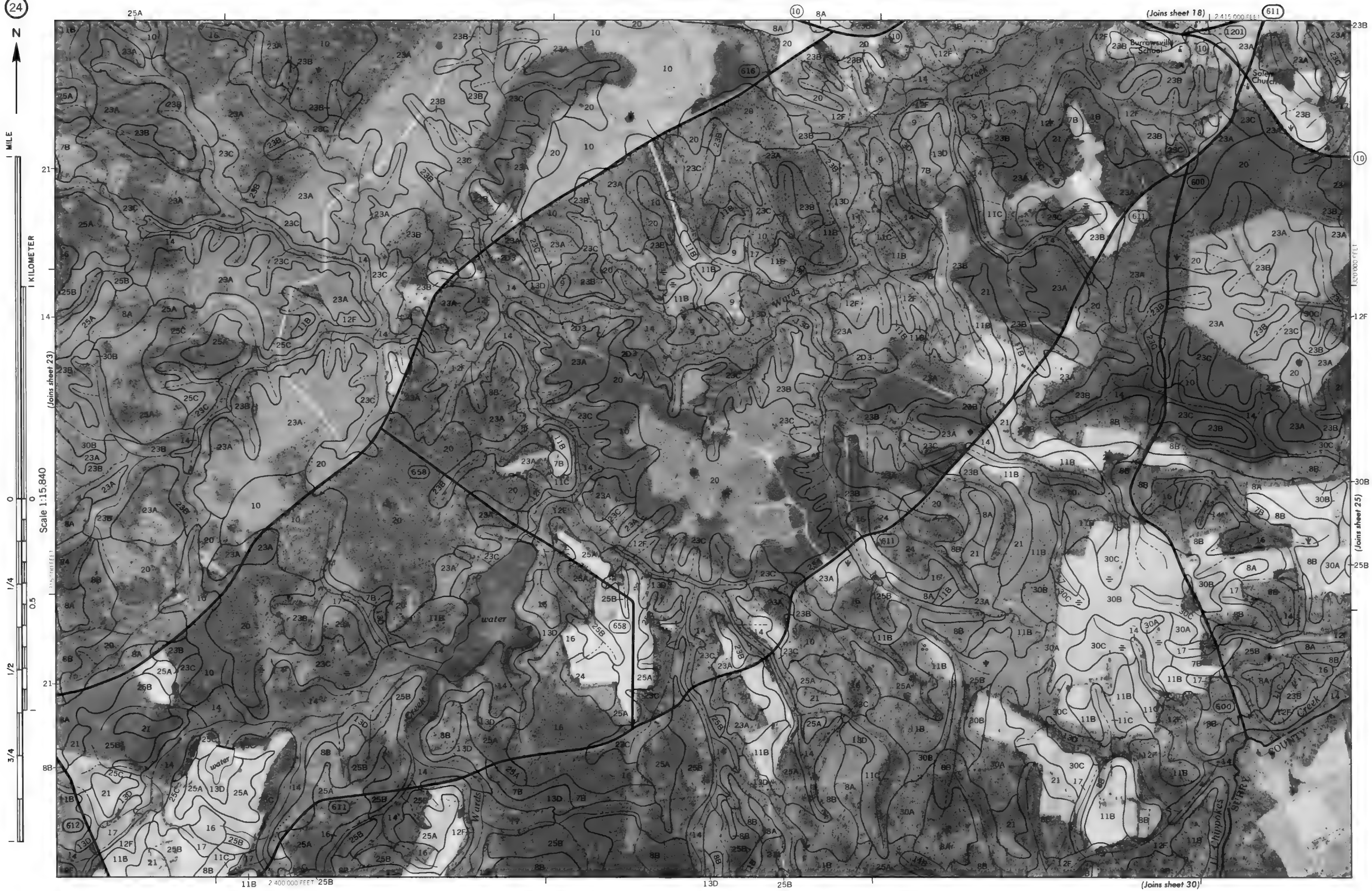

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PRINCE GEORGE COUNTY, VIRGINIA NO. 24

PRINCE GEORGE COUNTY, VIRGINIA NO. 25

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PRINCE GEORGE COUNTY, VIRGINIA NO. 26

PRINCE GEORGE COUNTY, VIRGINIA NO. 27

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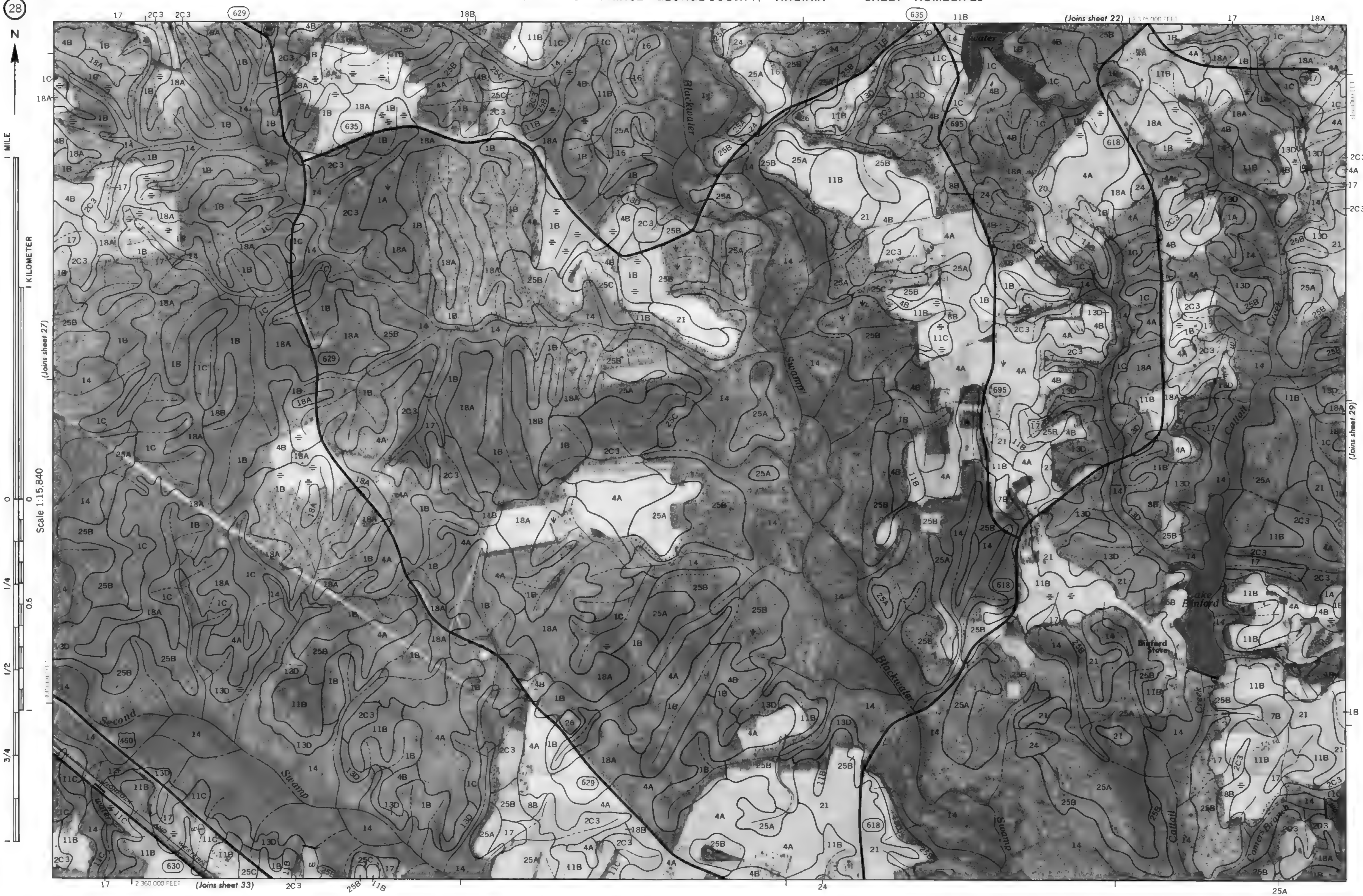

PRINCE GEORGE COUNTY, VIRGINIA NO. 28

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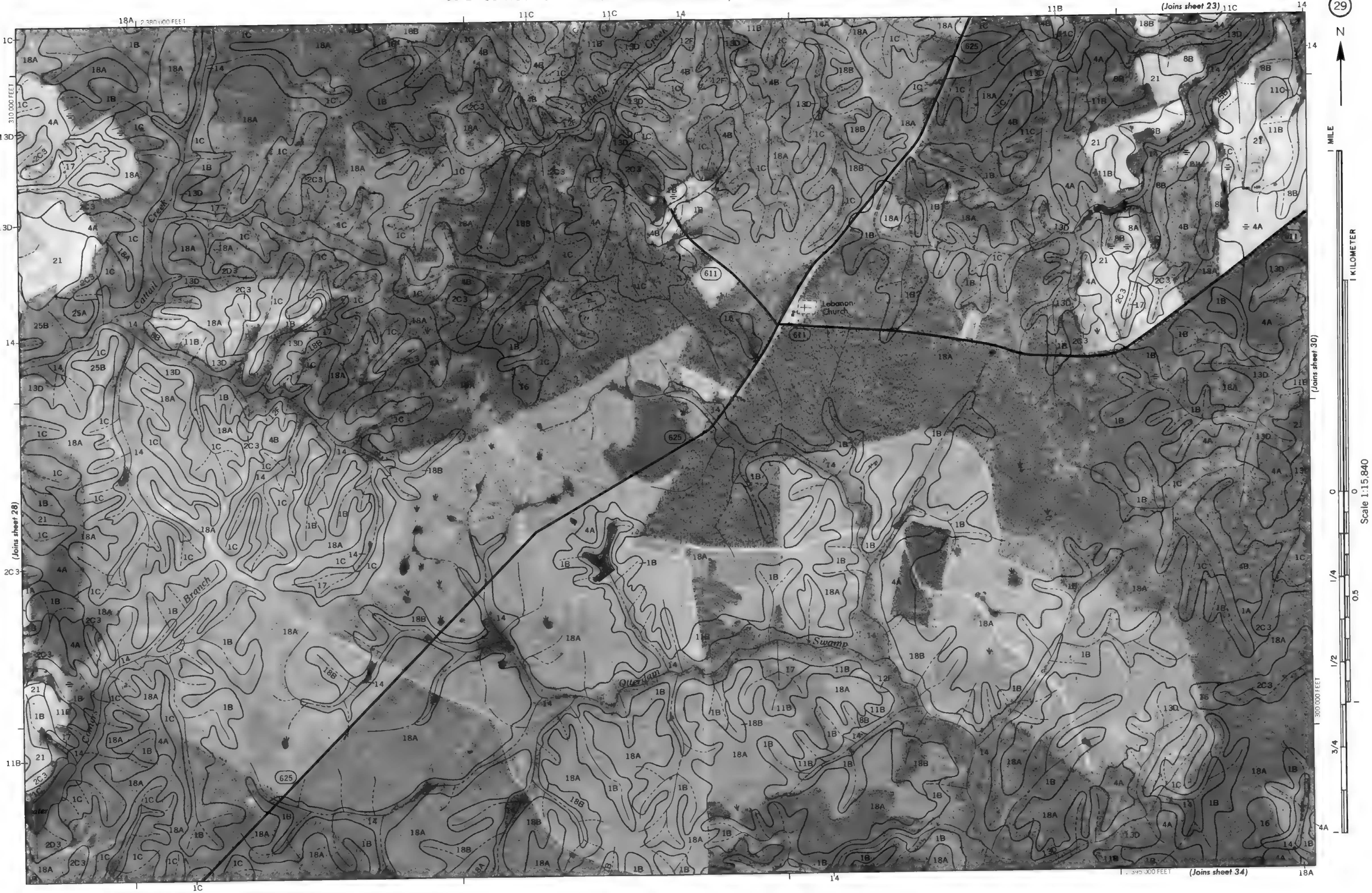

PRINCE GEORGE COUNTY, VIRGINIA NO. 29

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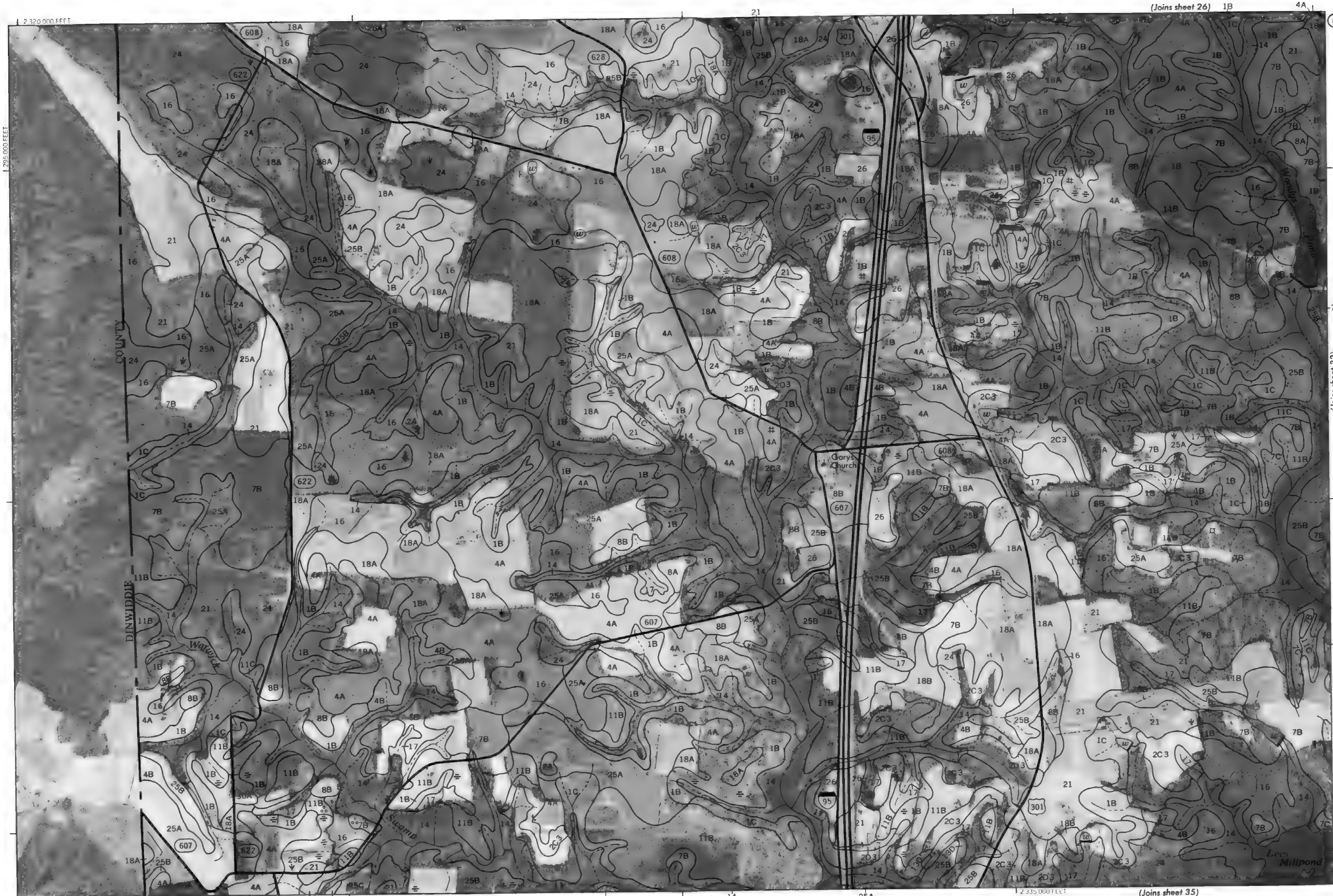


PRINCE GEORGE COUNTY, VIRGINIA NO. 31

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1971 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

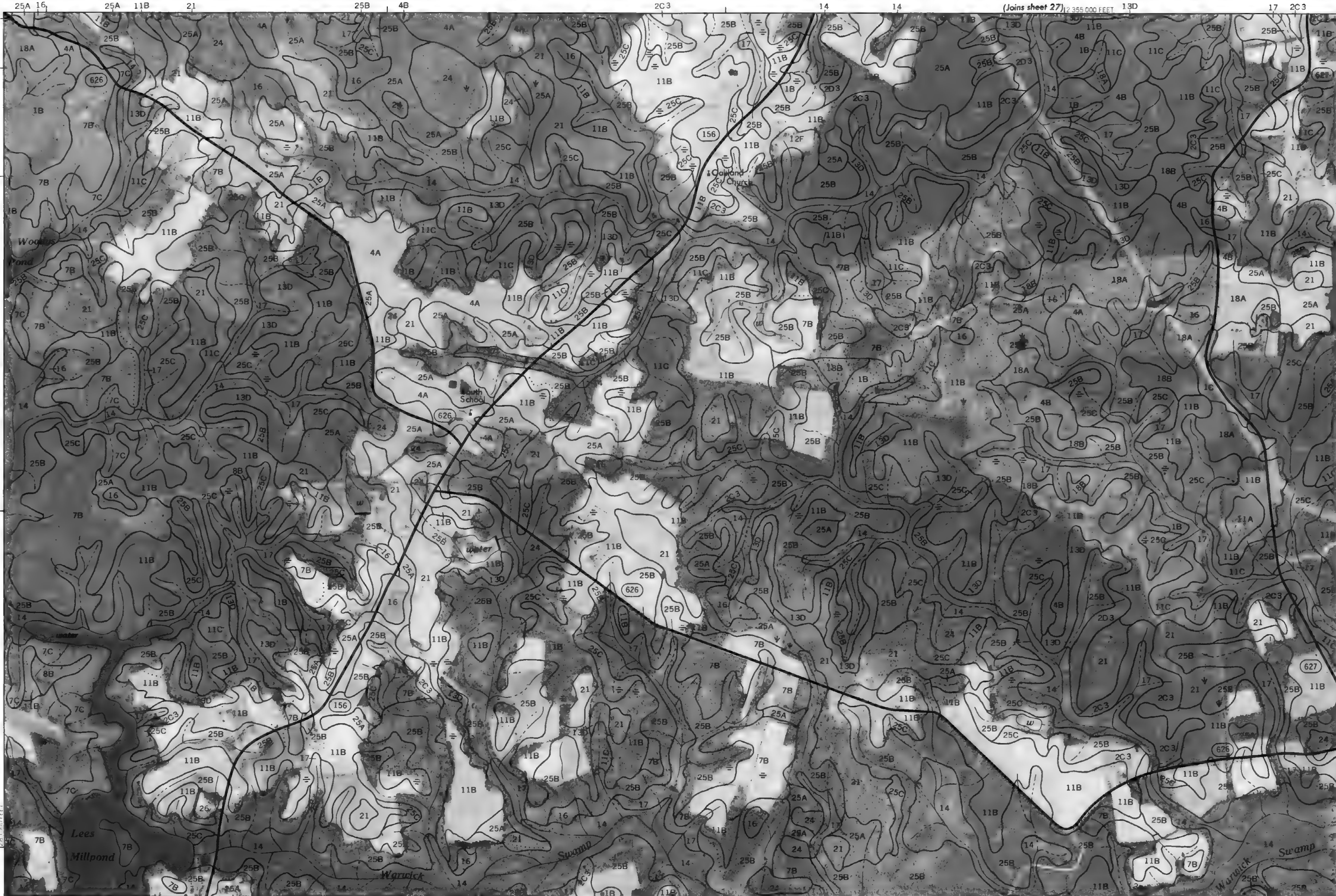
32

N

1 MILE

1 KILOMETER

Scale 1:15,840



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PRINCE GEORGE COUNTY, VIRGINIA NO. 32

PRINCE GEORGE COUNTY, VIRGINIA NO. 33

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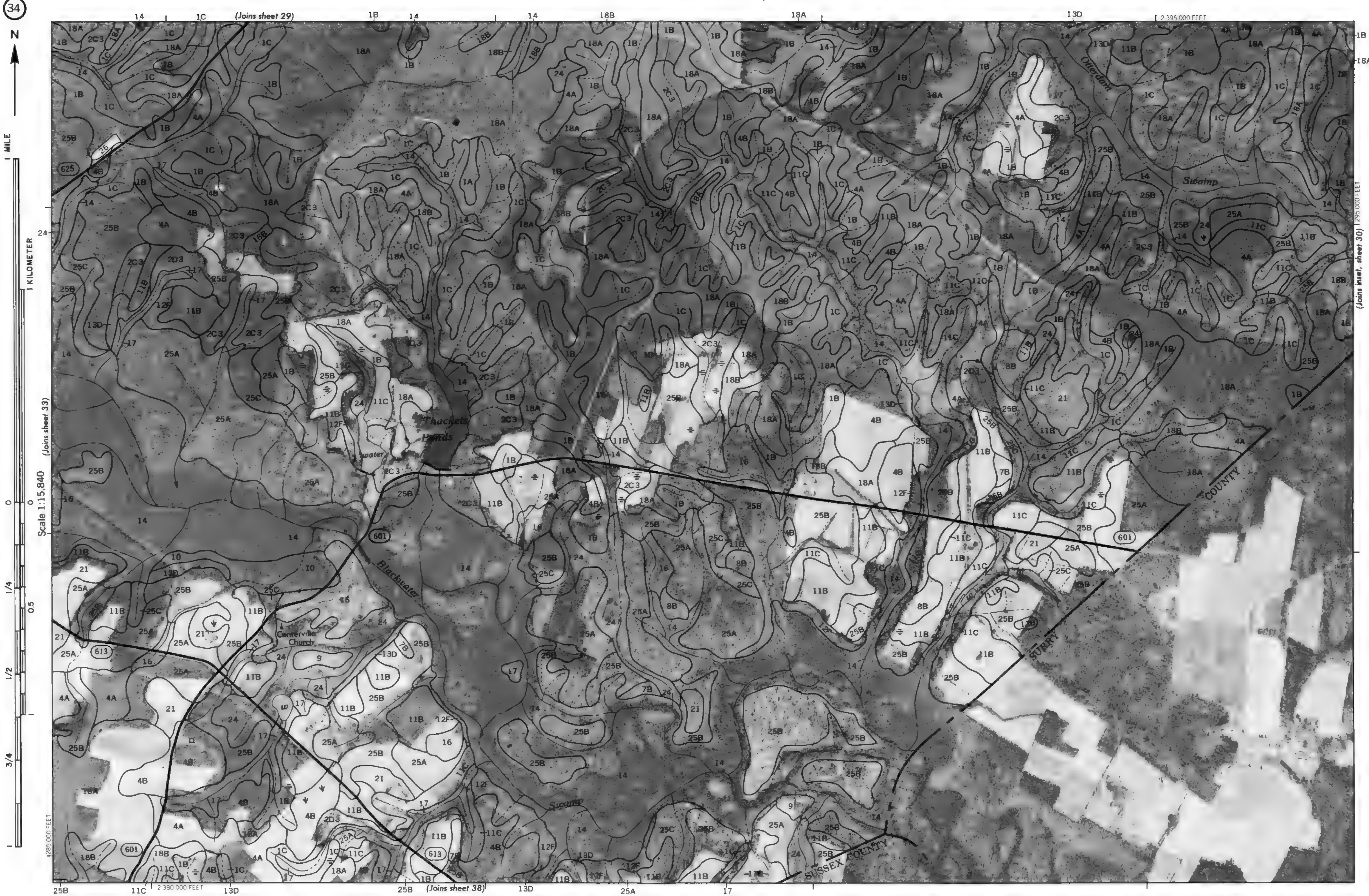

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PRINCE GEORGE COUNTY, VIRGINIA NO. 34

SOIL SURVEY OF PRINCE GEORGE COUNTY, VIRGINIA — SHEET NUMBER 35

PRINCE GEORGE COUNTY, VIRGINIA NO. 35

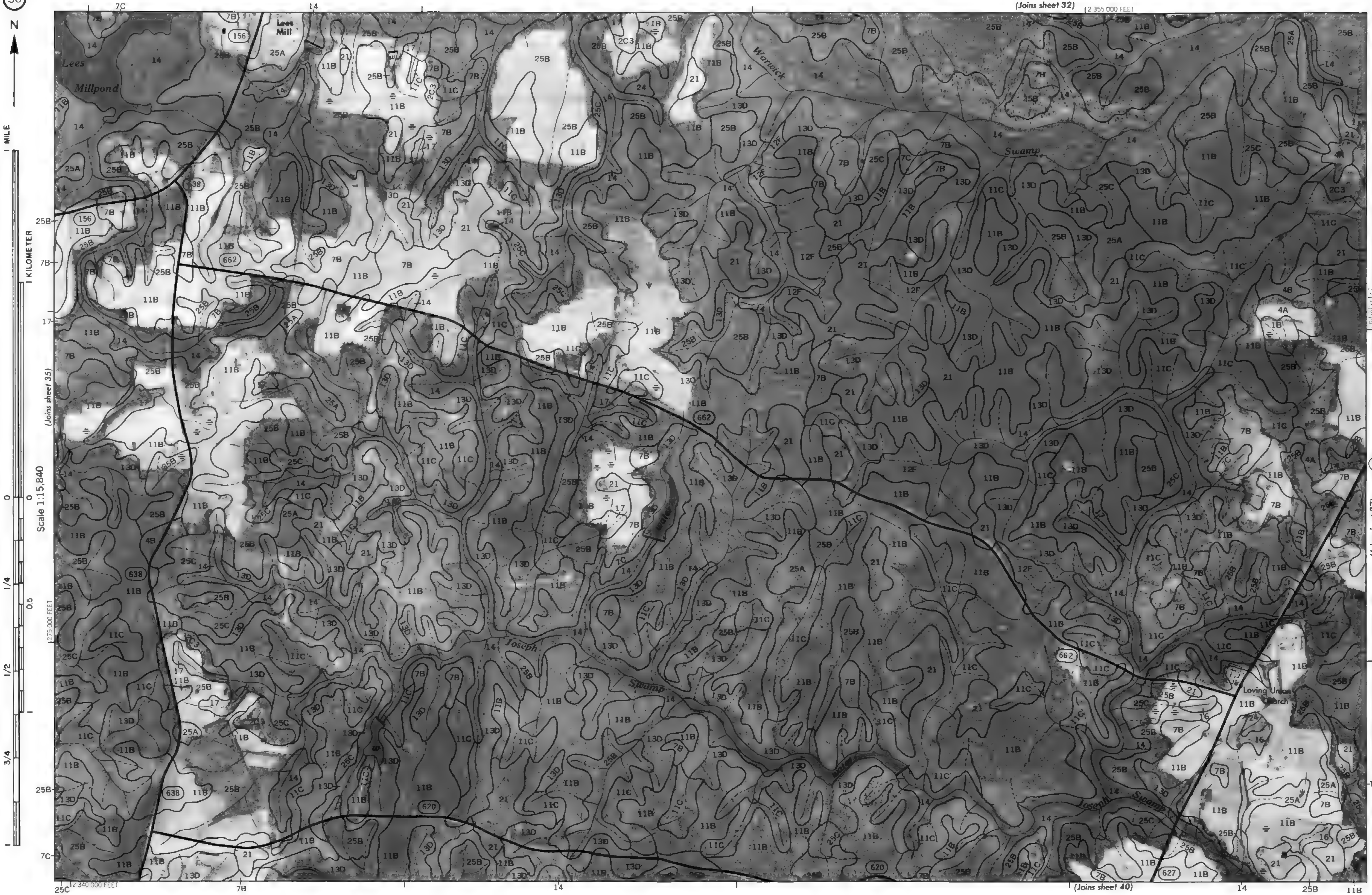
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1971 aerial photography. Coordinate grid ticks and land division corners, if shown are approximately positioned.

1 MILE

1 KILOMETER

Scale 1:15 840

36

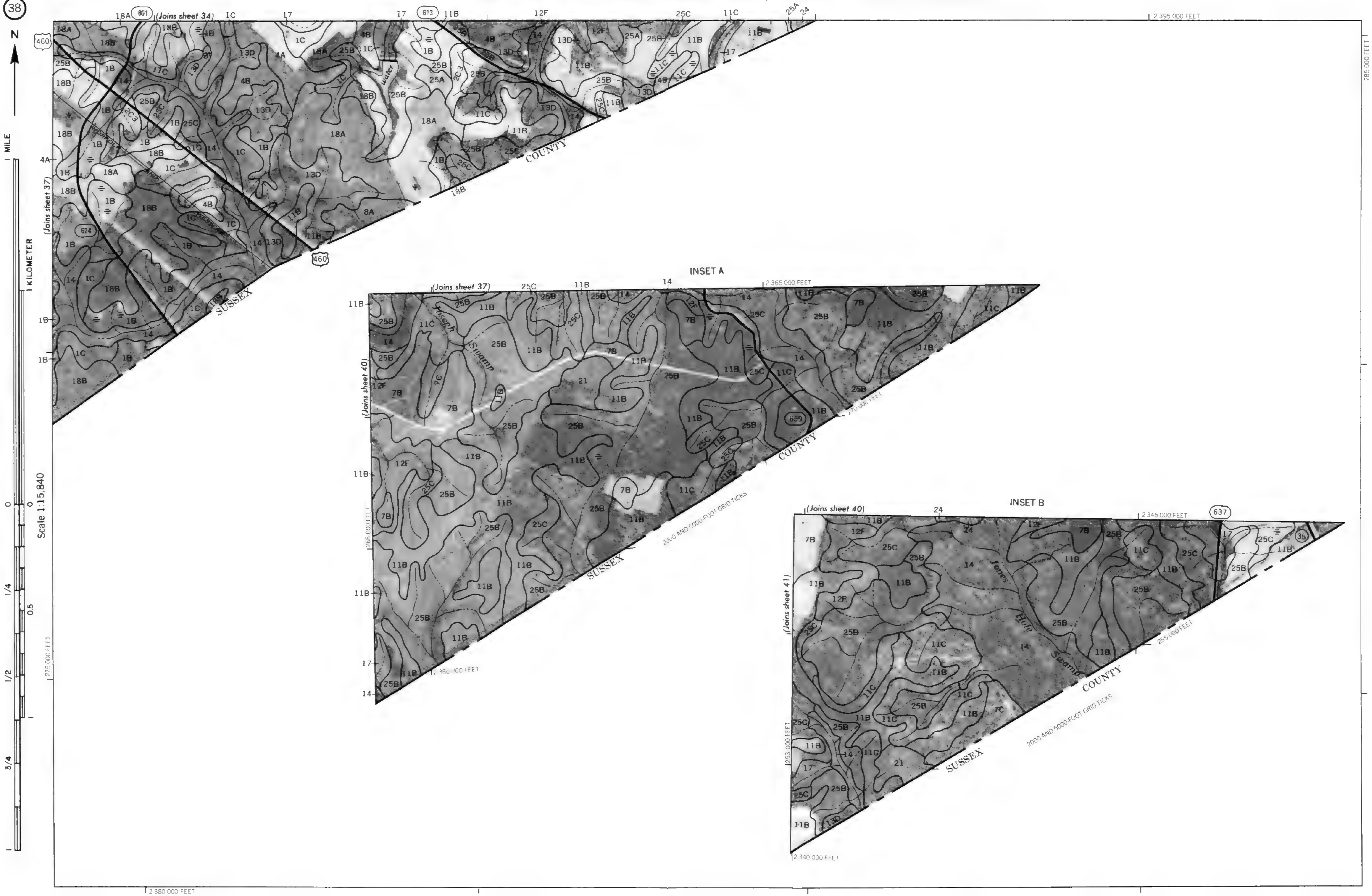


This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Base maps are controlled photomosaics prepared from 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

PRINCE GEORGE COUNTY, VIRGINIA NO. 36

PRINCE GEORGE COUNTY, VIRGINIA NO. 37

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Base maps are prepared from 1971 aerial photography. Coordinate grid ticks and land division corners, if shown are approximately positioned.



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Base maps are controlled photomosaics prepared from 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

39

N

Scale 1:15,840

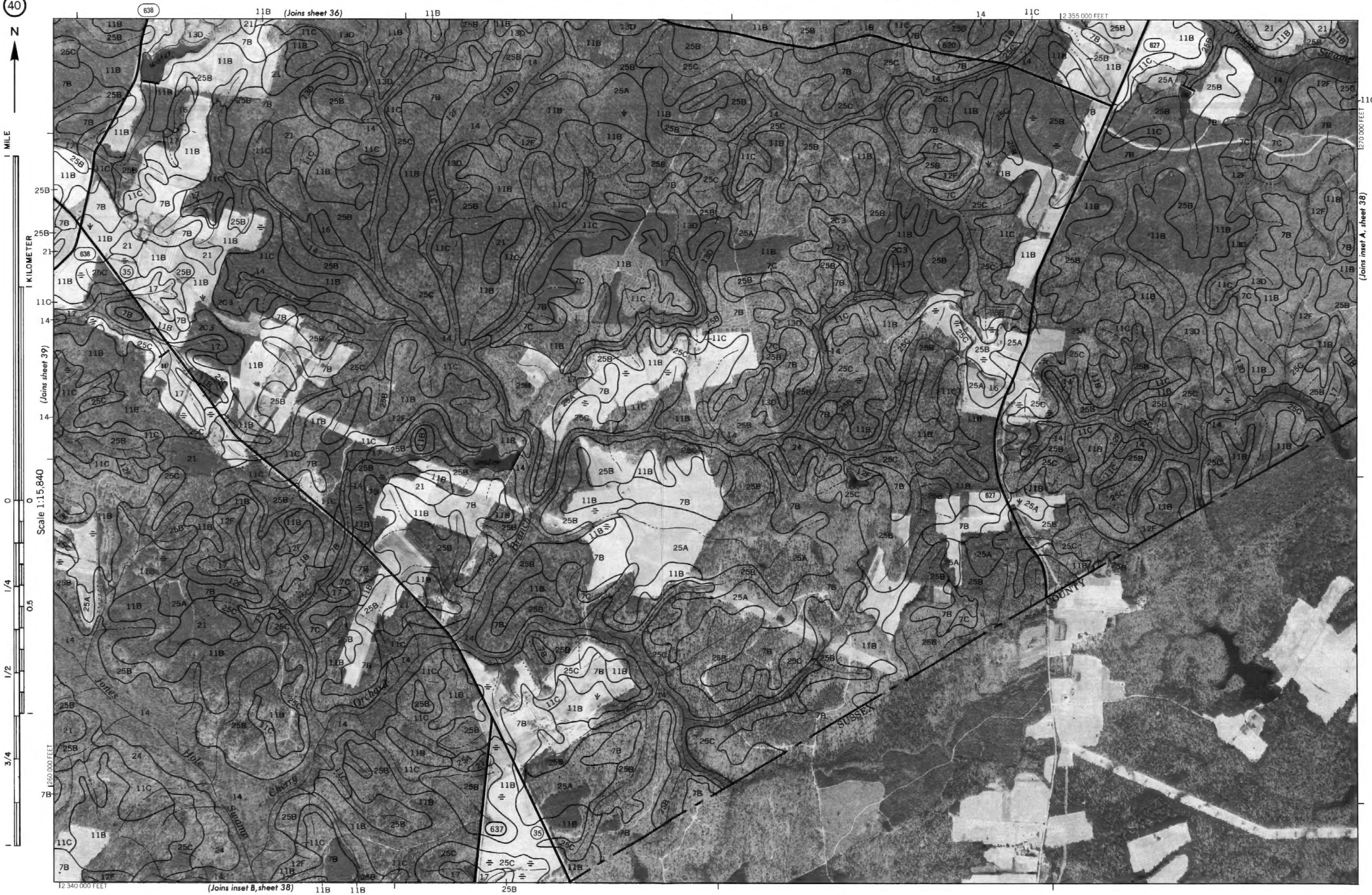
0 1/4 1/2 3/4 1 MILE

0 0.5 1 KILOMETER

PRINCE GEORGE COUNTY, VIRGINIA NO. 39

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1971 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

40



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PRINCE GEORGE COUNTY, VIRGINIA NO. 40

PRINCE GEORGE COUNTY, VIRGINIA NO. 41

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1971 aerial photography.
Coordinate grid ticks and land division corners, if shown are approximately positioned.

SOIL LEGEND

Publication symbols consist of numbers or a combination of numbers and letters (e. g. 1A, 2D3, 20, or 30C). The initial numbers represent the kind of soil. A capital letter of A, B, C, D, or F following these numbers indicates the class of slope. Symbols without a slope letter are for nearly level soils or miscellaneous areas. A number 3 following the slope class indicates the soil is severely eroded.

SYMBOL	NAME
1A	Ackwater silt loam, 0 to 2 percent slopes
1B	Ackwater silt loam, 2 to 6 percent slopes
1C	Ackwater silt loam, 6 to 10 percent slopes
2C3	Ackwater silty clay loam, 6 to 10 percent slopes, severely eroded
2D3	Ackwater silty clay loam, 10 to 25 percent slopes, severely eroded
3	Argent silt loam
4A	Aycock silt loam, 0 to 2 percent slopes
4B	Aycock silt loam, 2 to 6 percent slopes
5	Bojac loamy sand
6	Bolling silt loam
7B	Bonneau loamy sand, 0 to 6 percent slopes
7C	Bonneau loamy sand, 6 to 10 percent slopes
8A	Burrowsville sandy loam, 0 to 2 percent slopes
8B	Burrowsville sandy loam, 2 to 6 percent slopes
9	Catpoint fine sand
10	Chickahominy silt loam
11B	Emporia fine sandy loam, 2 to 6 percent slopes
11C	Emporia fine sandy loam, 6 to 10 percent slopes
12F	Emporia soils, 15 to 45 percent slopes
13D	Emporia and Slagle soils, 6 to 15 percent slopes
14	Kinston complex
15	Levy silt loam
16	Lynchburg loam
17	Lynchburg - Slagle complex
18A	Montross silt loam, 0 to 2 percent slopes
18B	Montross silt loam, 2 to 6 percent slopes
19	Muckalee loam
20	Newflat silt loam
21	Norfolk fine sandy loam
22A	Pamunkey loam, 0 to 2 percent slopes
22B	Pamunkey loam, 2 to 6 percent slopes
23A	Peawick silt loam, 0 to 2 percent slopes
23B	Peawick silt loam, 2 to 6 percent slopes
23C	Peawick silt loam, 6 to 10 percent slopes
24	Rains loam
25A	Slagle sandy loam, 0 to 2 percent slopes
25B	Slagle sandy loam, 2 to 6 percent slopes
25C	Slagle sandy loam, 6 to 10 percent slopes
26	Udorthents, loamy
27	Udorthents, clayey
28	Urban land
29	Urban land-Udorthents complex
30A	Wickham fine sandy loam, 0 to 2 percent slopes
30B	Wickham fine sandy loam, 2 to 6 percent slopes
30C	Wickham fine sandy loam, 6 to 10 percent slopes

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline & neatline

AD HOC BOUNDARY (label) — Hedley Airstrip

- Small airport, airfield, park, oilfield, cemetery, or flood pool — FLOOD POOL LINE

STATE COORDINATE TICK

LAND DIVISION CORNERS (sections and land grants)

ROADS

- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEM & DESIGNATIONS

- Interstate — 21
- Federal — 173
- State — 28
- County, farm or ranch — 1283

RAILROAD

POWER TRANSMISSION LINE (normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES

- Without road
- With road
- With railroad

DAMS

- Large (to scale)
- Medium or small — water

PITS

- Gravel pit
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban areas)
- Church
- School
- Indian mound (label) — Indian Mound
- Located object (label) — Tower
- Tank (label) — Gas
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
  - Double-line (label) — CANAL
  - Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

- Perennial — water, w
- Intermittent — int, i

MISCELLANEOUS WATER FEATURES

- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS — 21, 11B

ESCARPMENTS

- Bedrock (points down slope)
- Other than bedrock (points down slope)

SHORT STEEP SLOPE

GULLY

DEPRESSION OR SINK

SOIL SAMPLE SITE (normally not shown) — S

MISCELLANEOUS

- Blowout
- Clay spot
- Gravelly spot
- Gumbo, slick or scabby spot (sodic)
- Dumps and other similar non soil areas
- Prominent hill or peak
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip (tips point upslope)
- Stony spot, very stony spot
- Pits, burrow
- Udorthents